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The State of ConTech

Hammad Chaudhry
Vice President, Innovation & Construction Technology
EllisDon



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**"The best *vision*
is *insight*."**

- Malcolm Forbes



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DD DIGITAL
& DATA
ENGINEERING

What happened that led us to this point in
ConTech?



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1785-1845



First Wave

During the Industrial Revolution the first factory emerged; a cotton mill in Britain.

History of Technology & Innovation

6 Waves since the industrial revolution



Quarry Bank Mill (also known as Styal Mill) in Styal, Cheshire, in northwest England. It is one of the best preserved textile factories of the Industrial Revolution. Quarry Bank Mill was established by Samuel Greg and dates from 1784.

1785-1845



First Wave

During the Industrial Revolution the first factory emerged; a cotton mill in Britain.

1845-1900



Second Wave

As railways proliferated, their networks strongly influenced urban growth.



History of Technology & Innovation

6 Waves since the industrial revolution

1785-1845



First Wave

During the Industrial Revolution the first factory emerged; a cotton mill in Britain.

1845-1900



Second Wave

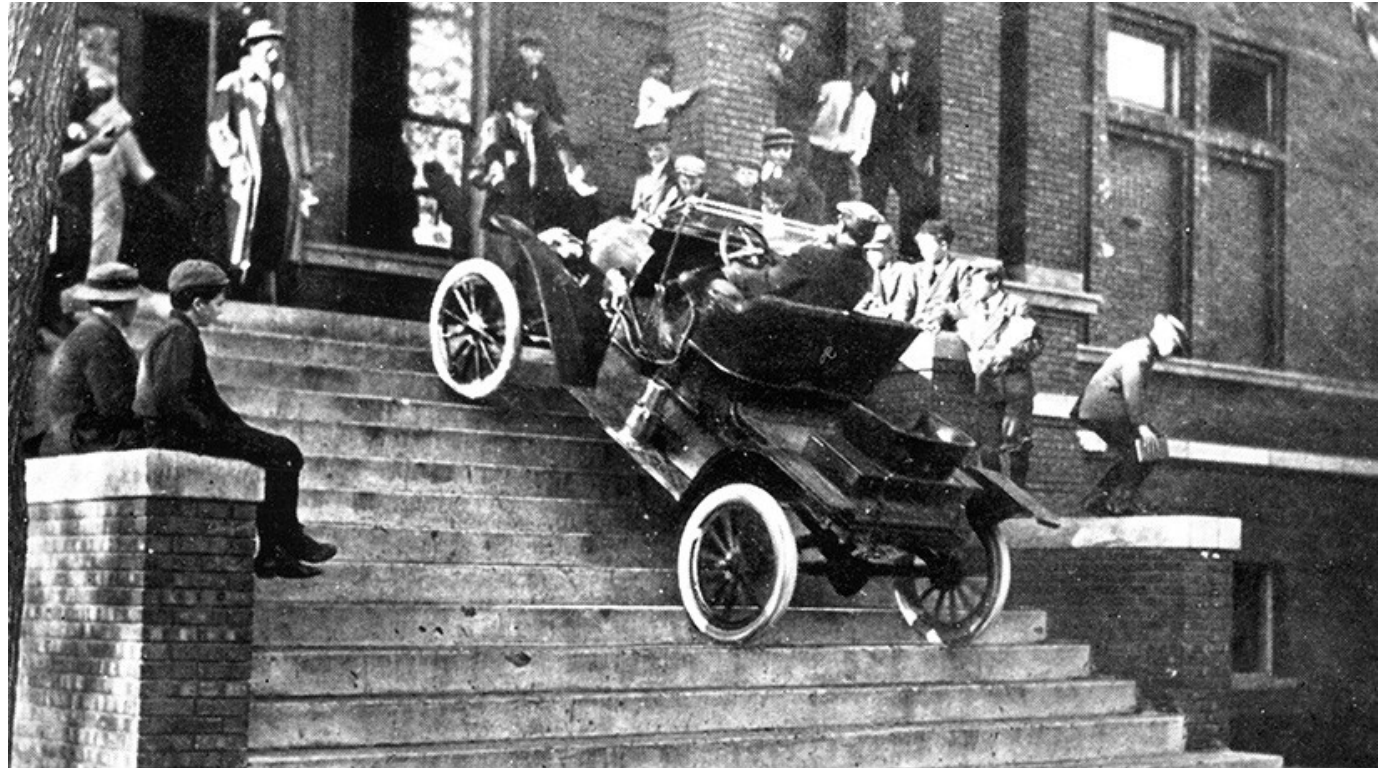
As railways proliferated, their networks strongly influenced urban growth.

1900-1950



Third Wave

Henry Ford and the Model T revolutionized the auto industry and manufacturing.



History of Technology & Innovation

6 Waves since the industrial revolution



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1785-1845



First Wave

During the Industrial Revolution the first factory emerged; a cotton mill in Britain.

1845-1900



Second Wave

As railways proliferated, their networks strongly influenced urban growth.

1900-1950



Third Wave

Henry Ford and the Model T revolutionized the auto industry and manufacturing.

1950-1990



Fourth Wave

Global expansion of aviation service unlocks economic integration.



History of Technology & Innovation 6 Waves since the industrial revolution



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1990-2020



Fifth Wave

The growth of the internet and software ushered in the digital era.



History of Technology & Innovation 6 Waves since the industrial revolution



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2020-Present | Sixth Wave



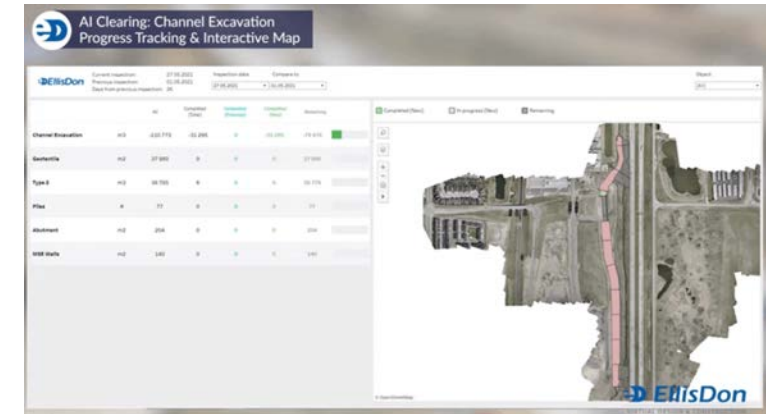
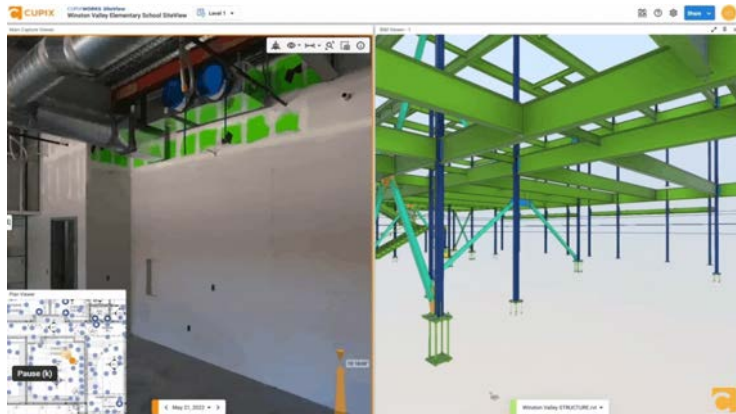
AI, ML, CV, IoT



Clean Tech & ESG



Drones & Robotics





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Sketchpad & hydraulics

materials

1960's

1970's

History of technology in building & construction

1963 – **Sketchpad** – define geometry
and manipulate objects in space.

Superficial implementation.

1960s – Majority of equipment
becomes **hydraulic**

Material and petrochemical
advancements allowed for new
innovation in:

- Silicone
- Flex Metal
- Conduits



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CAD era

1980s

1980's – AutoCAD is born.

1984 – CAD on personal computers

1986 – Building Modelling – Robert
Aish

Pre-BIM

1990's

+ Growth in the use of computers for construction project management systems.

+ Robotic Total Stations

1993 – Lawrence Berkley National Labs Development of Building Design Advisor

1997 – Predecessor to Revit Technology Corporation





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3D era

2000's

- 3D Modelling, BIM,
- MEP prefab
- Increase of BAS
- Bid software, document storage software
- Reality Capture
- Clash Detection

2001 – NavisWorks (Lightwork Design)

2002 – Autodesk acquires Revit for \$133m, Procore, Aconex

2004 – Collaborative working on one model.

2007 – Autodesk acquires NavisWorks

2008 – Parametric modelling, AGO Completed



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ConTech

2010's

- Growth of collaborative platforms, SaaS
- Document management domination (Fieldwire, Procore, Plangrid)
- Mobile platforms
- Mainstream BIM
- Scheduling, Planning, QA/QC
- 360 Platforms
- Advanced Reality Capture
- VR/AR
- Consumer Drones, Robotics



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Era of Data

2020+

Era of data. Wave of acquisitions & venture capital in ConTech.

The confluence of societal, economic, demographic, and technological changes are making our industry front and centre.

We are in a
paradigm
shift

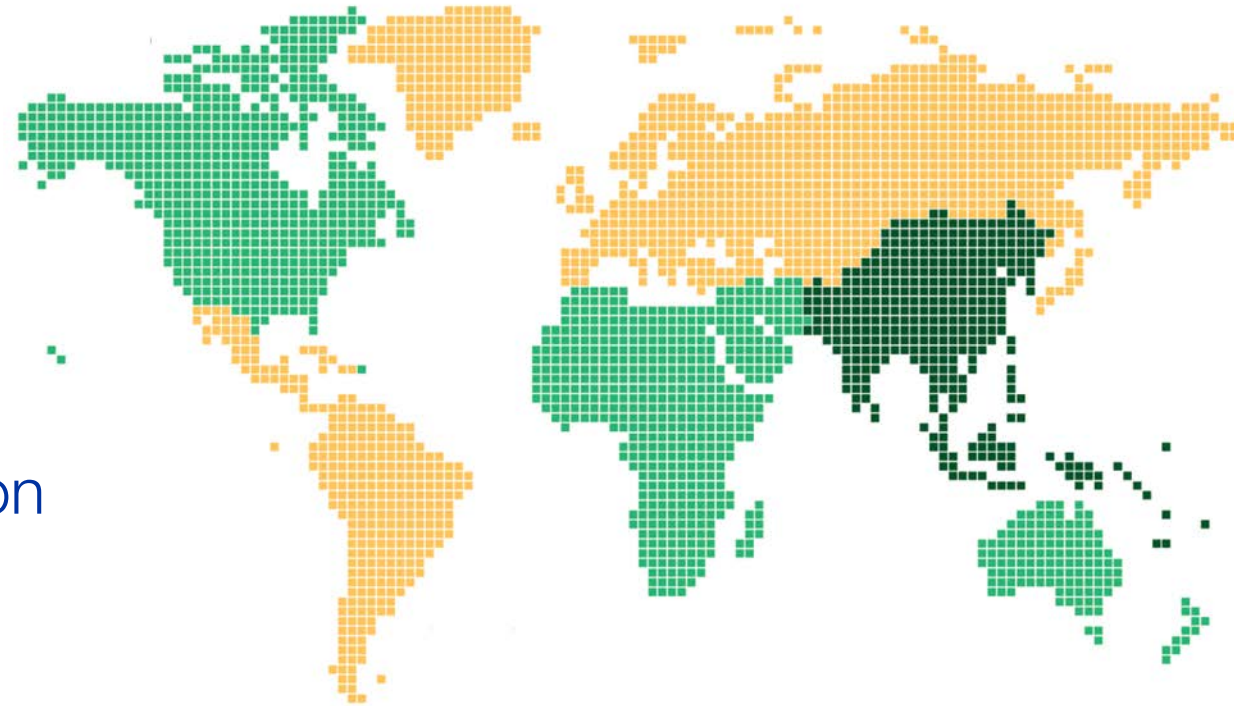


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Construction related spending accounts for
13% of the world's GDP!

**7% of the working age population works in
construction**

By 2025 projected **\$14 trillion** to be spent on
construction; buildings, infrastructure,
industrial, etc...



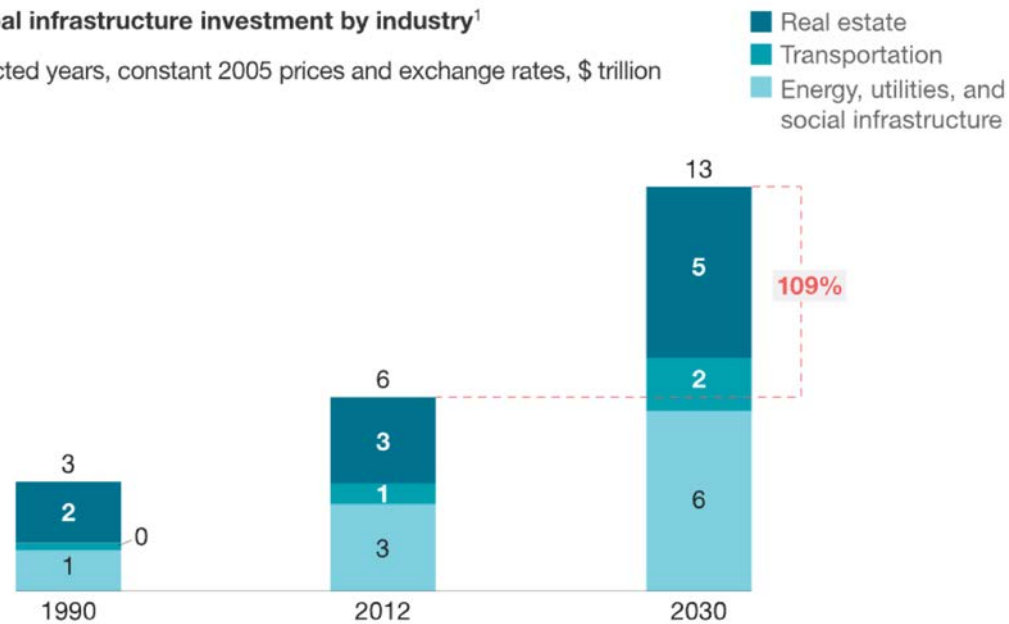
Source: Economist
Economist.com



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Global infrastructure investment by industry¹

Selected years, constant 2005 prices and exchange rates, \$ trillion



Megaprojects' share in the future²

12% by number of projects
77% by project value

¹Forecast assumes price of capital goods increases at same rate as other goods and assumes no change in inventory.

²Project award date 2015 and beyond.

McKinsey&Company



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Capital-expenditure overrun
(% of original quoted capital expenditure)

● Mining ■ Oil and gas ◆ Infrastructure



- **98% of projects** incur cost overruns or delays.
- The average **cost increase** is **80%** of original value.
- The average **slippage** is **20 months** behind original schedule.

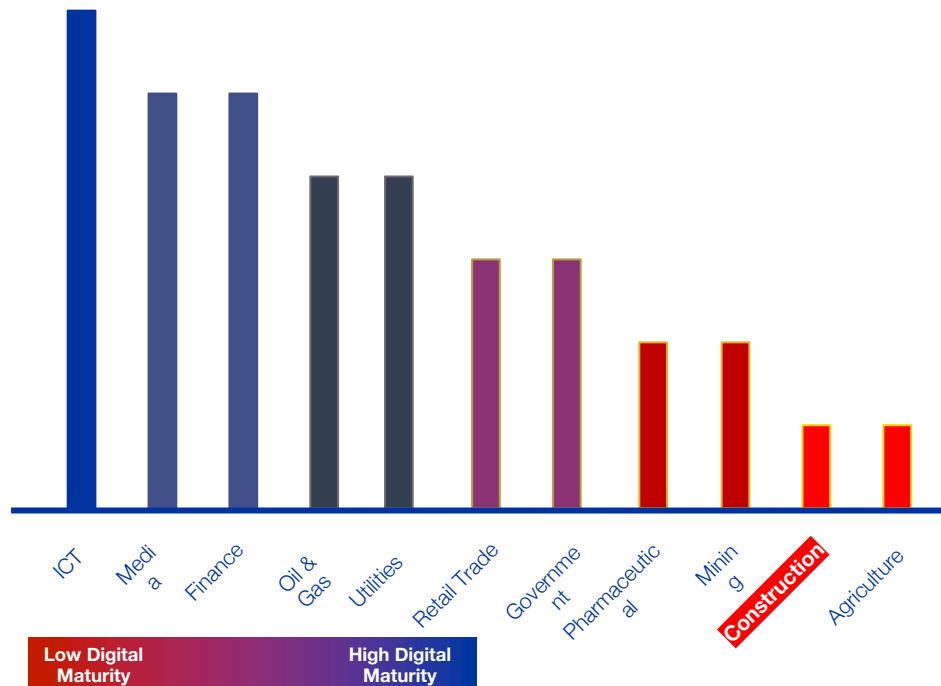
Source: Companies' public annual reports; IHS Herold Global Projects Database, November 19, 2013; press releases

McKinsey&Company



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Digital Maturity Landscape

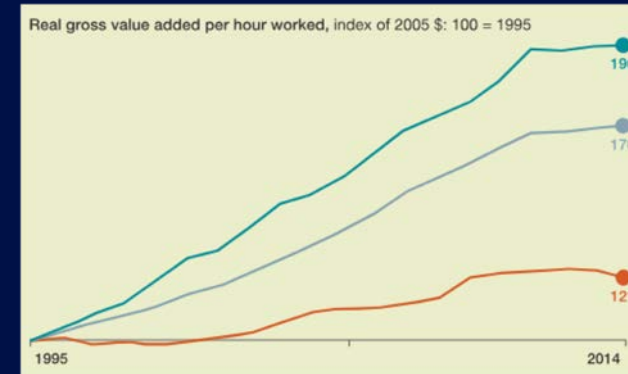


Despite the development of new technologies, construction as an industry continues to be **one of the least digitized sectors.**



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Globally, labour-productivity growth in construction lags far behind that of manufacturing or the total economy



Source: GGCD-10; national statistical agencies of Turkey, Malaysia, and Singapore; OECD, Rosstat; US Bureau of Economic Affairs; US Bureau of Labor Statistics; WIOD; World Bank; McKinsey Global Institute analysis

McKinsey&Company

Manufacturing

Total Economy

Construction



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Labour productivity in construction vs manufacturing



3D based processes, DfMA used for Ship Building, Aerospace & Automotive industries.



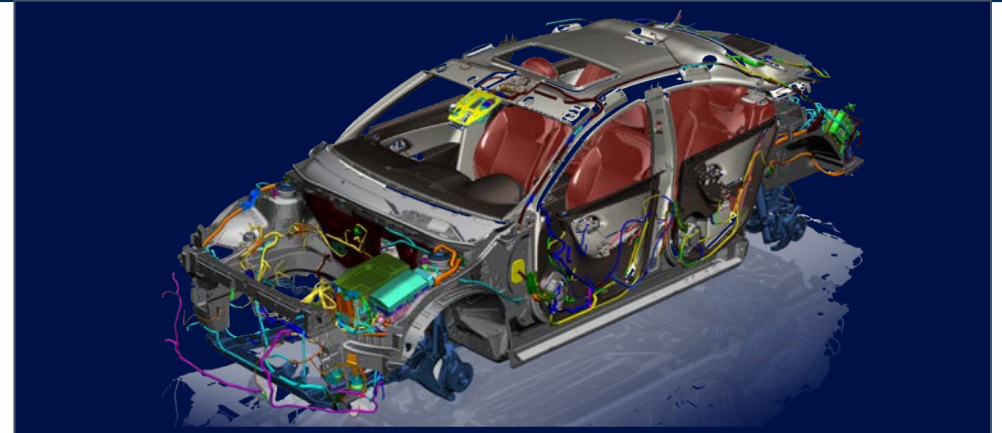
Allowed for more complex, better designed, higher quality, faster to market and less expensive products.



Drastic increase of labor efficiency



Controlled environment / predictable outcomes





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Berlin Brandenburg



Delays in opening of Berlin's new airport



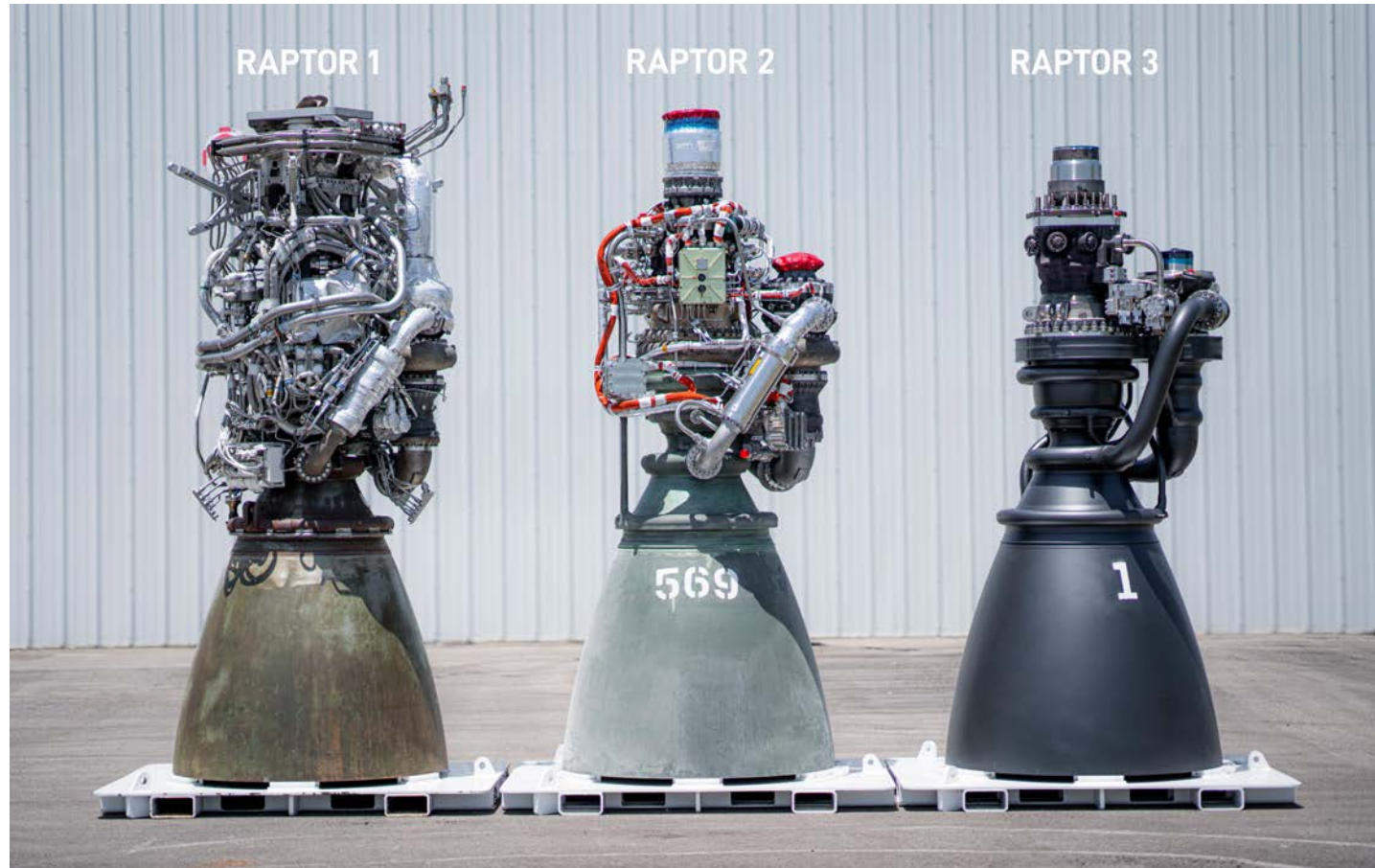


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Construction Management



Design-Bid-Build



Design-Build



Integrated Project Delivery



Project Management



Public-Private Partnership



Barriers to Adoption



Lack of digital skills & education

Statistic: A 2018 Autodesk and Associated General Contractors of America survey found that **80% of construction firms reported difficulty in filling hourly craft positions.**

- Skills gap in using modern digital tools.
- Training and upskilling required, leading to additional costs.



Lack of leadership & buy-in

Statistic: **72% of respondents** of a KPMG survey **believe that the industry is either just meeting the status quo or outright resistant to change.**

- Absence of support from top management.
- Digital transformation often not prioritized at the strategic level.



Regulatory & compliance challenges

Statistic: **only 31% of respondents** of a KPMG survey said their organizations are either **'cutting edge'** in terms of technology adoption, partly due to regulatory concerns

- Digital solutions may not align with existing regulations.
- Compliance complexities can deter firms from adopting new technologies.



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Barriers to Adoption



Traditional culture & resistance to change

Statistic: According to a McKinsey report, the construction industry is among the least digitized sectors globally.

- Deep-rooted preference for manual processes.
- Resistance to change, especially among long-time industry veterans.



Fragmented nature of the industry & tools

Statistic: Research by BCG indicates that full-scale digitalization can lead to a 20% reduction in project costs, emphasizing the importance of integrated systems.

- Digital tools often don't seamlessly integrate.
- Fragmented data and processes lead to inefficiencies.



High initial cost & ROI concerns

Statistic: A report by FMI found that **only 1% of revenue in the construction industry is spent on IT**, compared to the average of 3.3% across all industries.

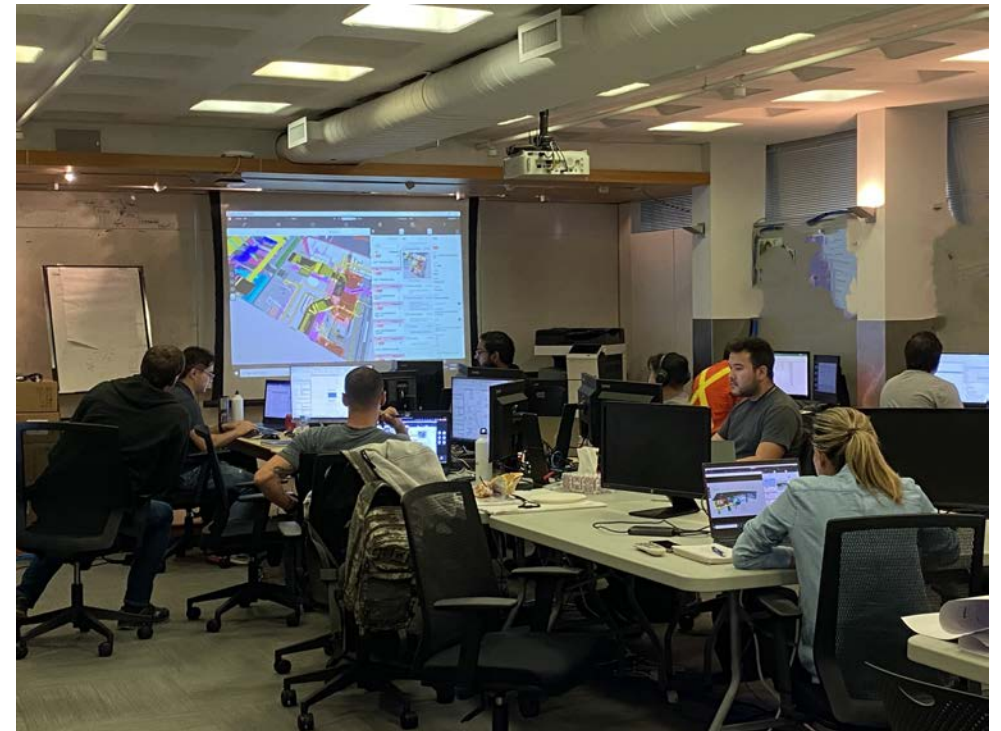
- Significant upfront investment in software and hardware.
- Deterrent for smaller firms with limited budgets.



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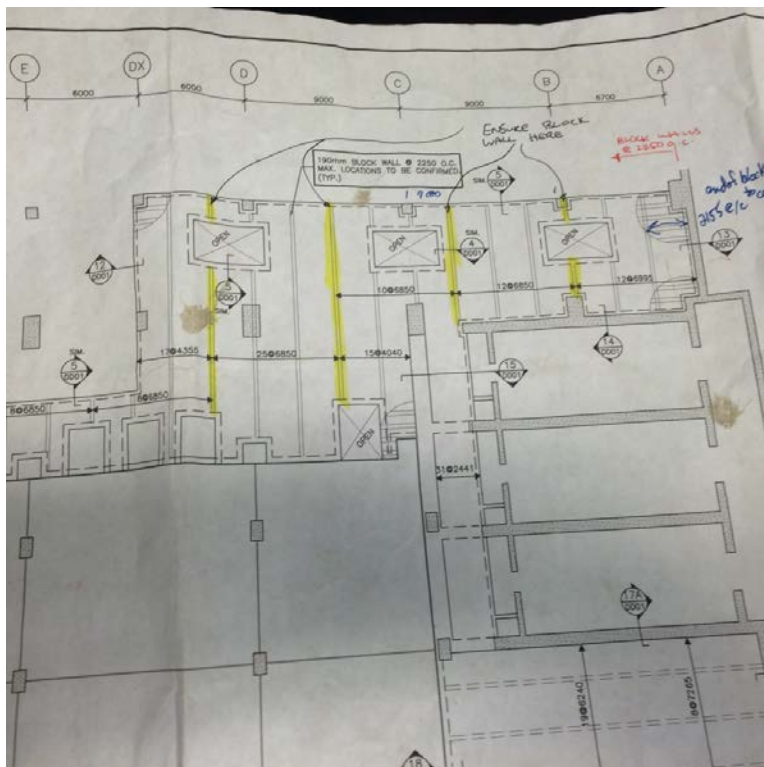
Lightbox v1.0



Lightbox v2.0



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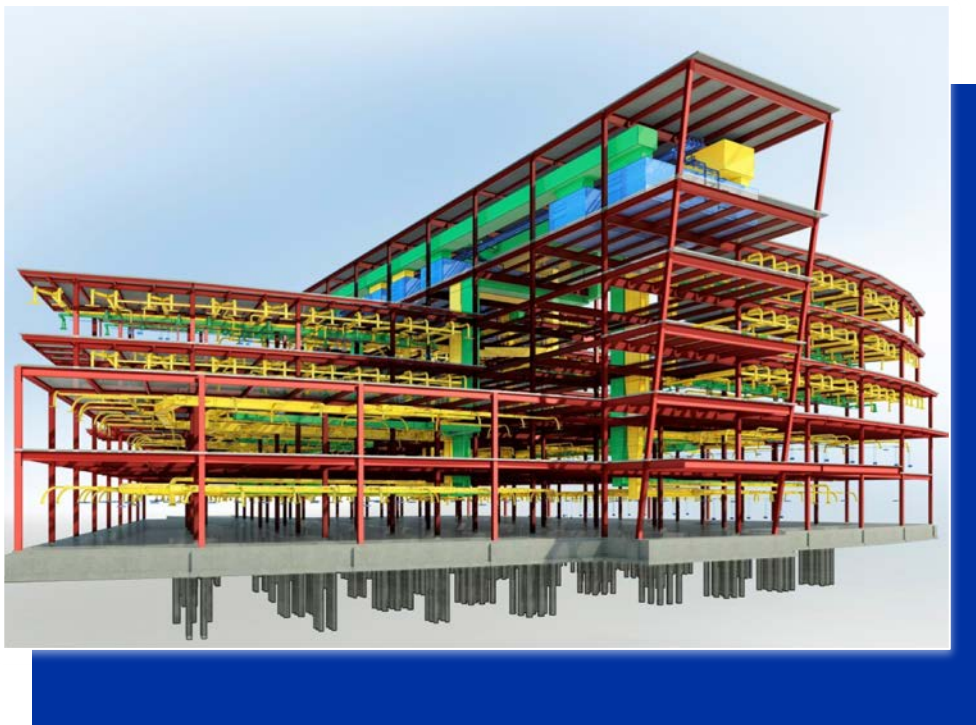
Markups v1.0



Markups v2.0



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Construction Documents



Logistics



Scheduling



Quantities



Fabrication



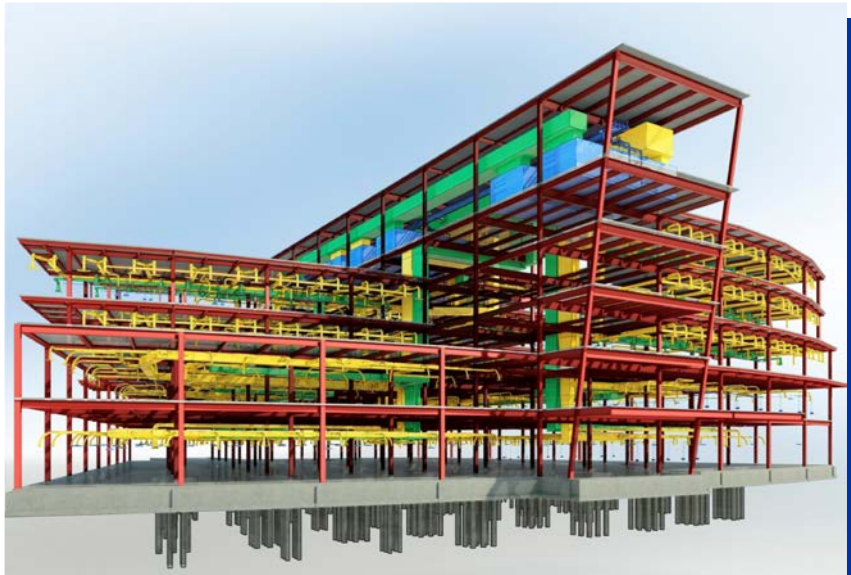
Coordination



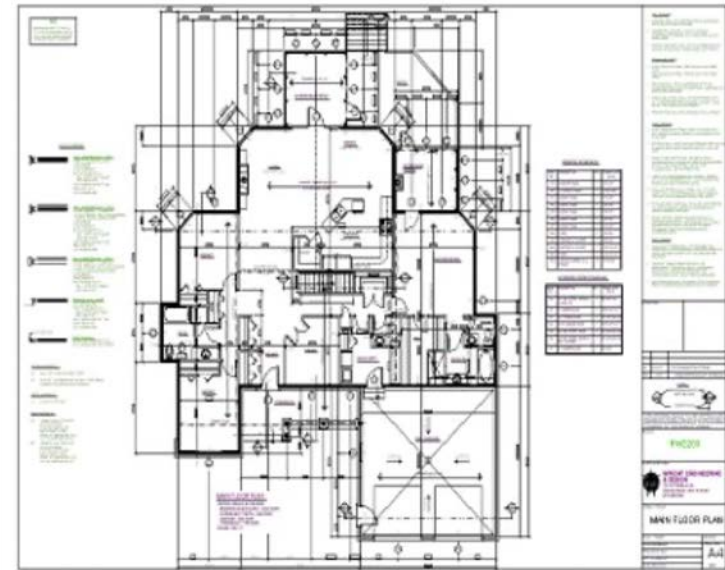
Visualization



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Model Development



Construction Documents

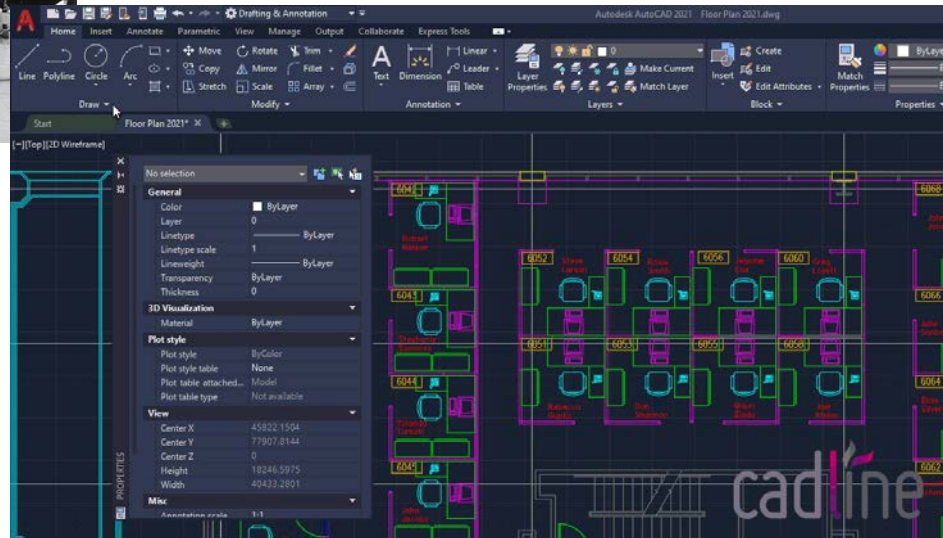


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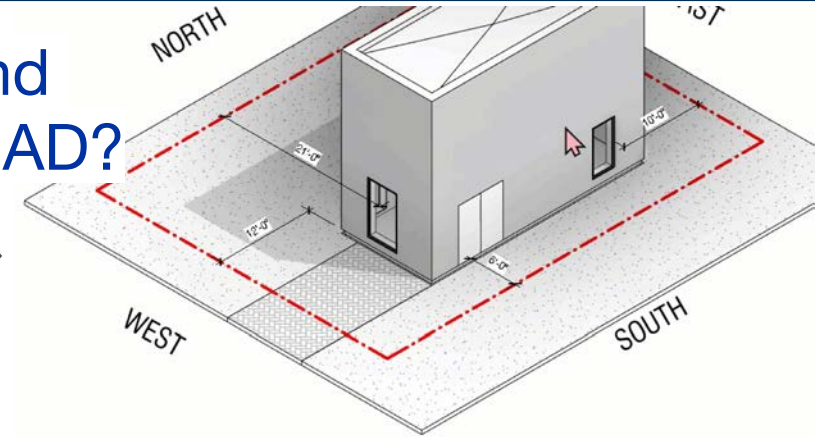
AutoCAD took 12 years to replace hand drafting, has BIM fully replaced AutoCAD?



Drafting v1.0



Drafting v2.0



WALL OPENINGS					
BUILDING SIDE	LIMITING DISTANCE	MAXIMUM OPENINGS %	WALL AREA	WALL OPENINGS	ACTUAL OPENINGS %
SOUTH	6'-0"	12%	601.51 SF	60 SF	10%
EAST	10'-0"	25%	213.05 SF	24 SF	11%
NORTH	21'-0"	80%	601.51 SF	84 SF	14%

Drafting v3.0



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Europe (Asia, Mid East)

- Europe, especially countries like the UK, Germany, France, and Russia, is **rapidly adopting & enforcing BIM and other digital construction technologies**.
- The **UK** exemplifies this trend by strictly **enforcing ISO 19650**, showcasing their commitment to digital transformation in construction.
- Middle East – UAE mandating digital building permits via BIM



USA

- **The USA**, without a federal BIM mandate, **has been a pioneer in its adoption**, with agencies like the GSA setting comprehensive BIM guidelines.
- Some state enforce the use of BIM. **The state of Wisconsin requires all public works projects worth over \$5 million to use BIM**



Canada

- **31% of the industry uses BIM**
- A KPMG survey highlighted that **Canadian developers have been slow to adopt construction technology** compared to their counterparts in other countries.
- The Canadian Construction Association's report emphasizes the **need for data-driven decisions and the adoption of digital technologies**.



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The construction industry stands at a pivotal moment, presenting an opportunity to bridge the digital and technological divide with other sectors.



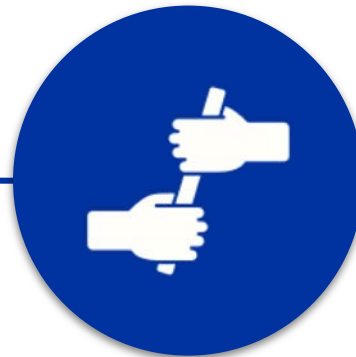
Aging workforce challenges

Aging workforce:

>30% of workers in construction are aged 55 and older.

Workforce shortages:

Demographic shifts threaten the ability of companies to staff projects adequately.



Tech savvy new generation

Young tech-savvy workers:

This generation's comfort with technology tends to have them choose careers accordingly.

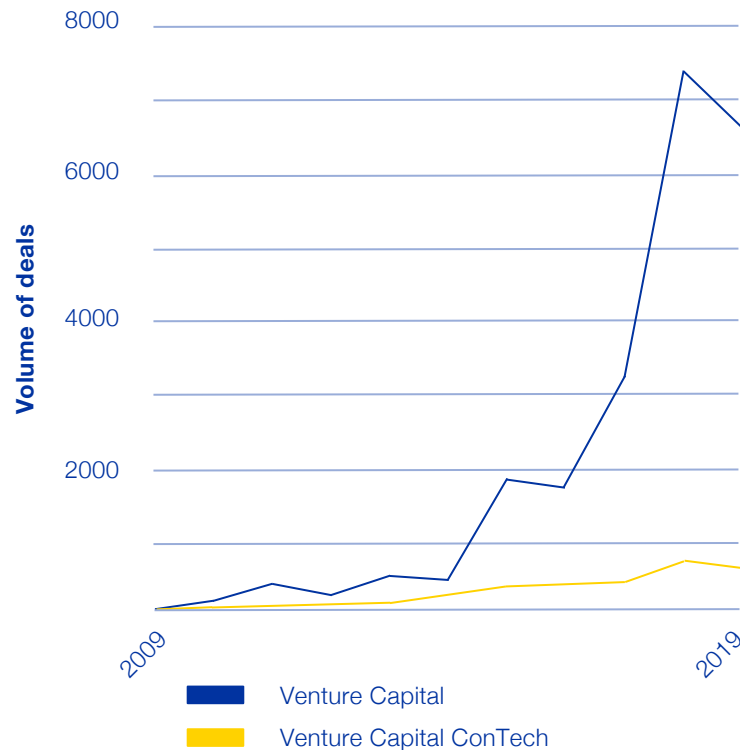
ConTech's role in labour shortages:

A survey of 275 construction companies indicates that the industry views digital technology as a key solution to address labour shortages.



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Venture-capital investment growth in PropTech & ConTech has become an area of interest for the traditional, generalist venture-capitalists.



\$50B invested in ConTech startups since 2014, 85% increase from the last 3 years.

30% increase in the amount of deals made from the last 3 years.

30% of construction organizations are investing in technology to improve operations and resilience.

Investment Drivers

- Disruptive tech development
- **Shortage of skilled labour** pushing companies to adopt digital solutions.
- Demand for **infrastructure**
- Growing awareness of **digitization** benefits
- Returns



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AECS-TECH: SHARE OF TOTAL GLOBAL VC FUNDING





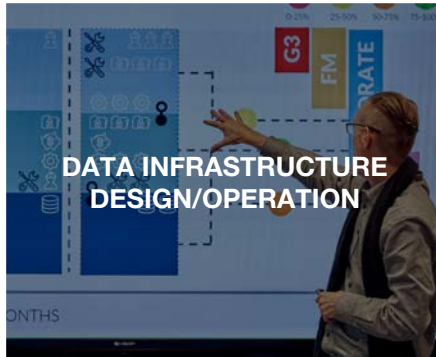
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How *is* the industry responding and what
have they done?



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What has EllisDon been up to?



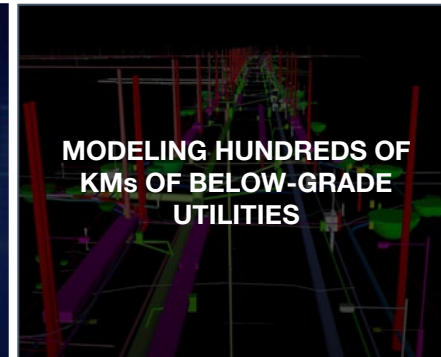
**DATA INFRASTRUCTURE
DESIGN/OPERATION**



**API INTEGRATIONS BETWEEN
IN-HOUSE AND 3rd PARTY
SOFTWARE**



PROJECT DASHBOARDS



**MODELING HUNDREDS OF
KMs OF BELOW-GRADE
UTILITIES**



**USING 4D MODELS,
TRACKING WITH DRONES &
360 PHOTO**



**DRONE & RPAS USE FOR
MONITORING, REPORTING,
TRACKING, ASSESSMENTS**



**INDUSTRY SOFTWARE
ANALYSIS & COMPARISON**



**LUXURY RESORT'S ENTIRE
TECH MODERNIZATION**



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EllisDon ConTech Ecosystem

20+ Startups through
ConTech Pilot Program

3 accelerator winners w/250+
applications since 2023

7 ConTech Strategic Partners

ConTech Pilots



AI
Clearing



OPTIMOTIVE
TECHNOLOGIES



VERSATILE



TOGAL.AI

siteaware

SMARTBÆRREL



BENCHMARKX



CUPIX
BUILD SMART



Touchplan



cmBuilder.io



Strux-Hub



Kwant



TIMESCAPES



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What have some other GCs been up to?



**Latium
Technologies**

PCL



vConstruct

DPR

INEIGHT

InEight

Kiewit



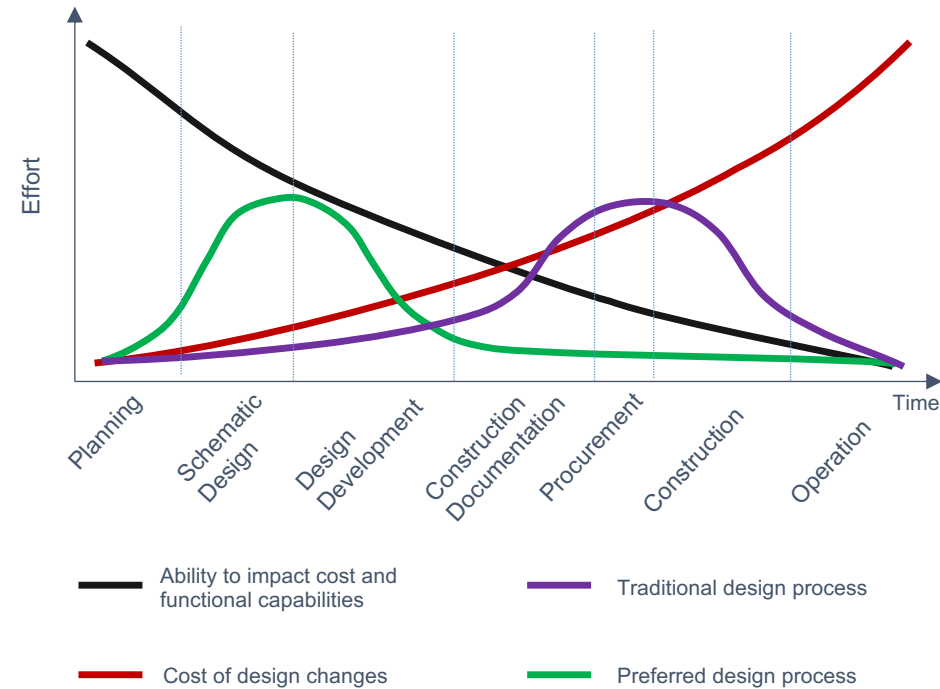
**FlyPaper
Technologies**

Barton Malow



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ConTech is *shifting* the curve





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Estimating: One of the largest parts of the construction process that has seen the least amount of digitization.
114k estimators in the US +/- 10 years away from retirement.

Traditional Software

Quantity Takeoff Process



6.1 minutes



Quantity Takeoff Process



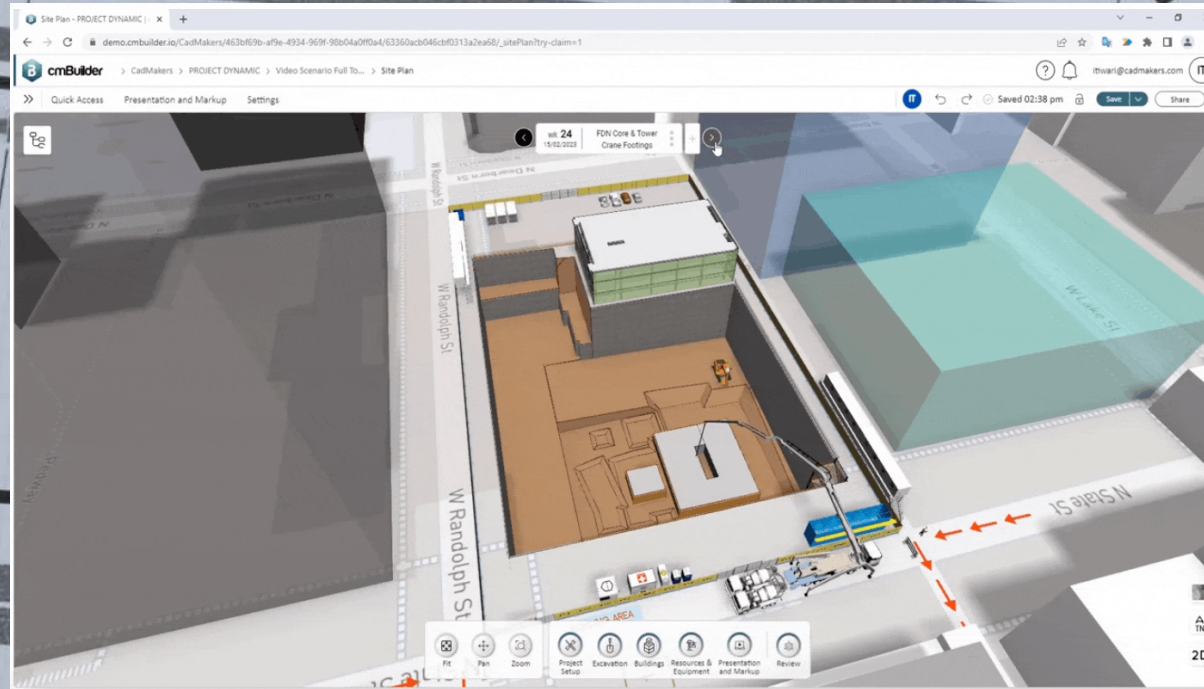
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Planning & scheduling: Effective planning is crucial to the industry and lack of causes a lot of issues. Cloud-based software and tools for helping corporate and field teams with resource allocation and earlier communication.





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Tracking & reporting: Construction has one of the lowest levels of real-time reporting on cash, people, assets. IoT devices and automated tools provide real-time tracking and transparency in project, financial, and resource reporting.





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Robotics: Robotics can help with construction industry issues around efficiency, safety, and productivity. Playing a big part to address labor shortages with a projection of **200 million additional construction jobs by 2030.**



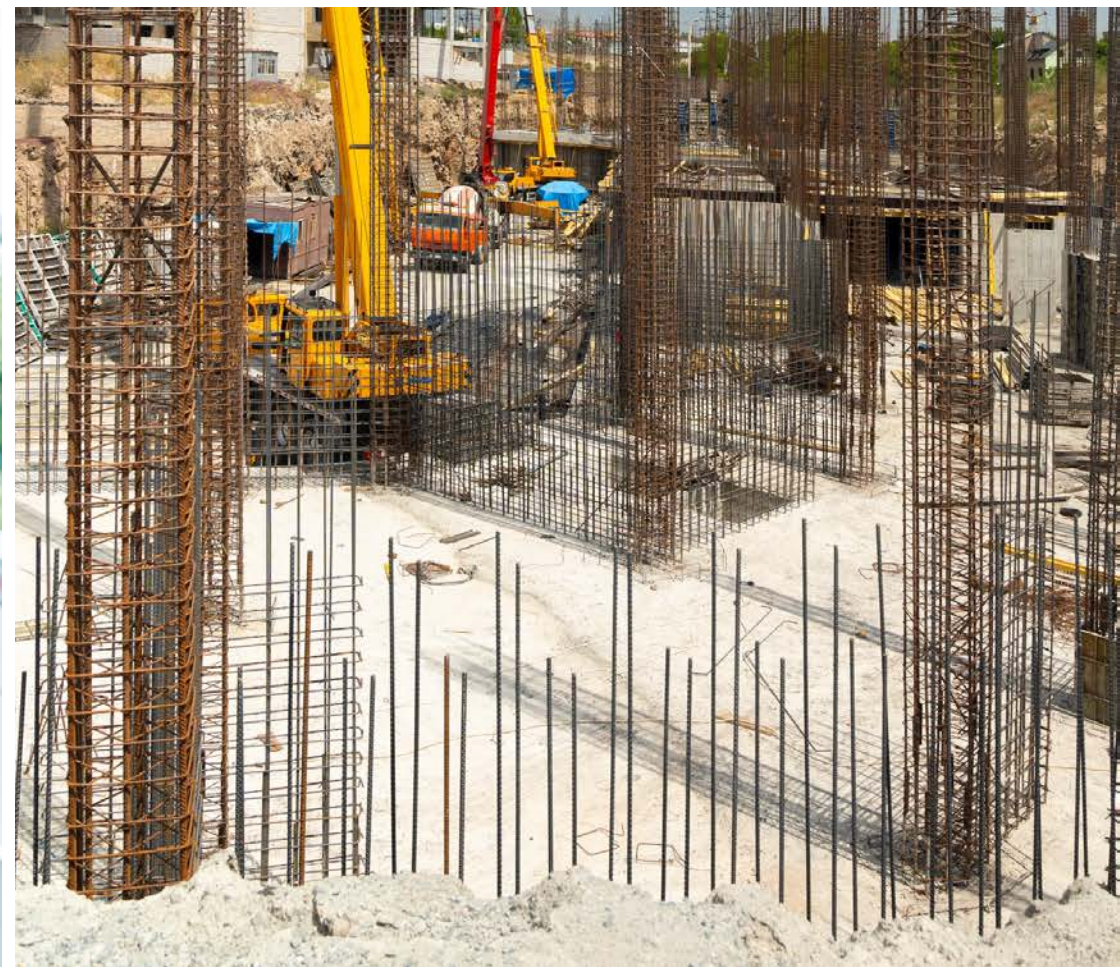


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How *are* innovative technologies improving established workflows and processes, or paving the way for transformative opportunities?



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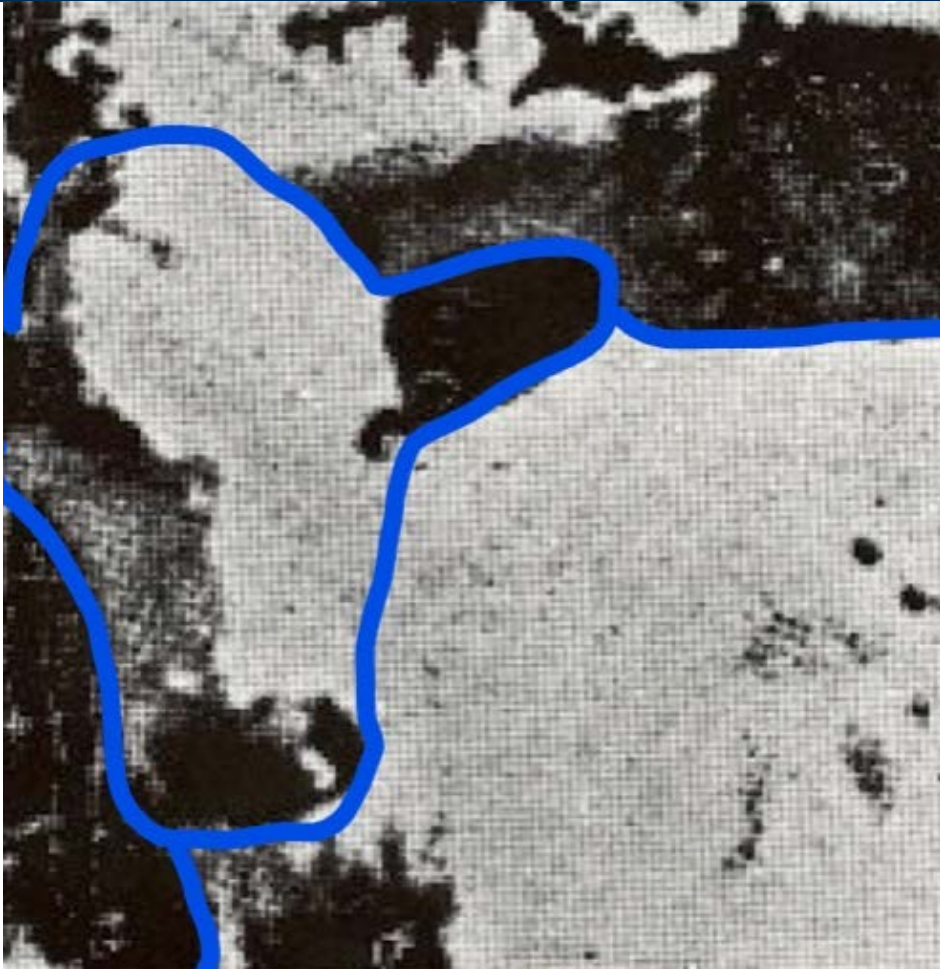




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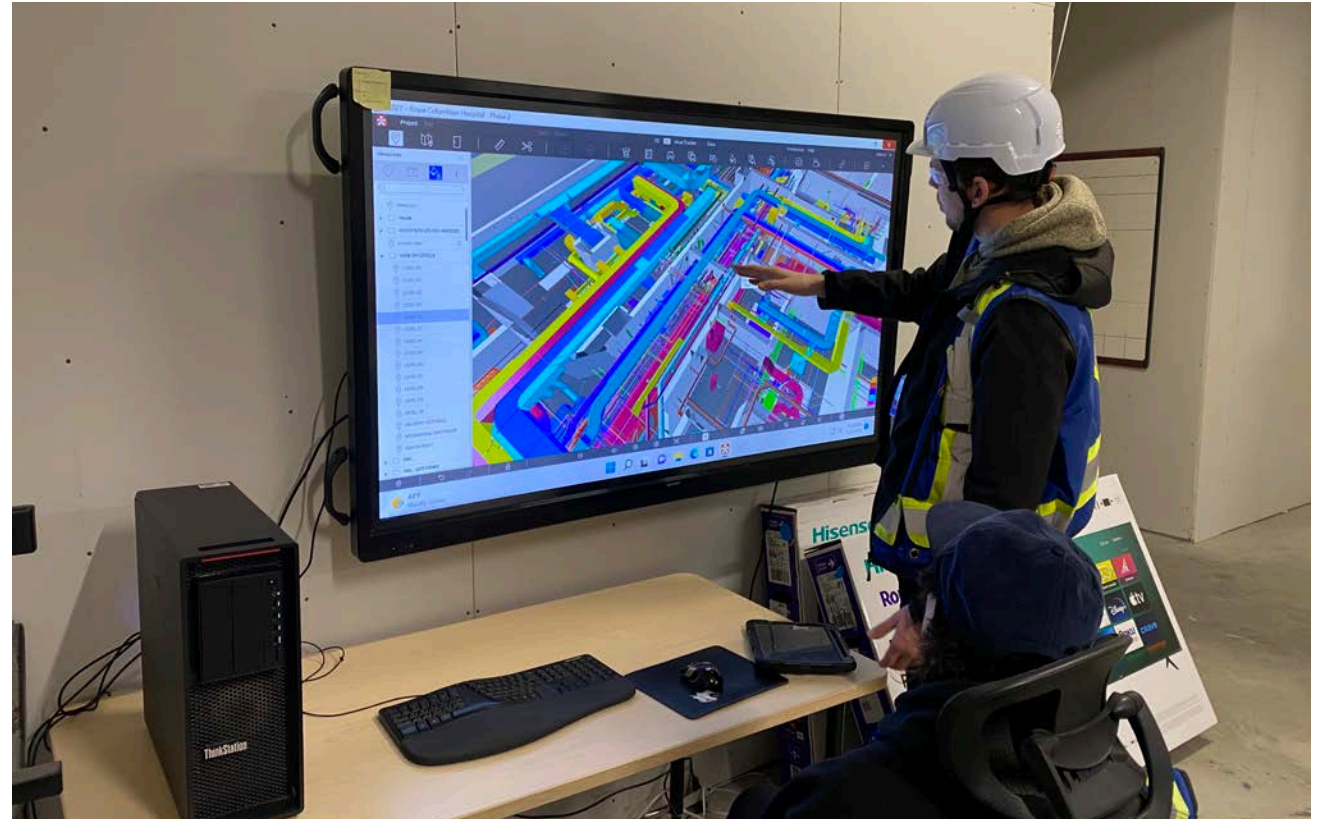
Visual Intelligence

What do you see?

- **No two people see things in quite the same way.**
- **Help bridge the gap.**



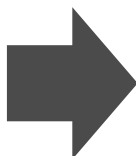
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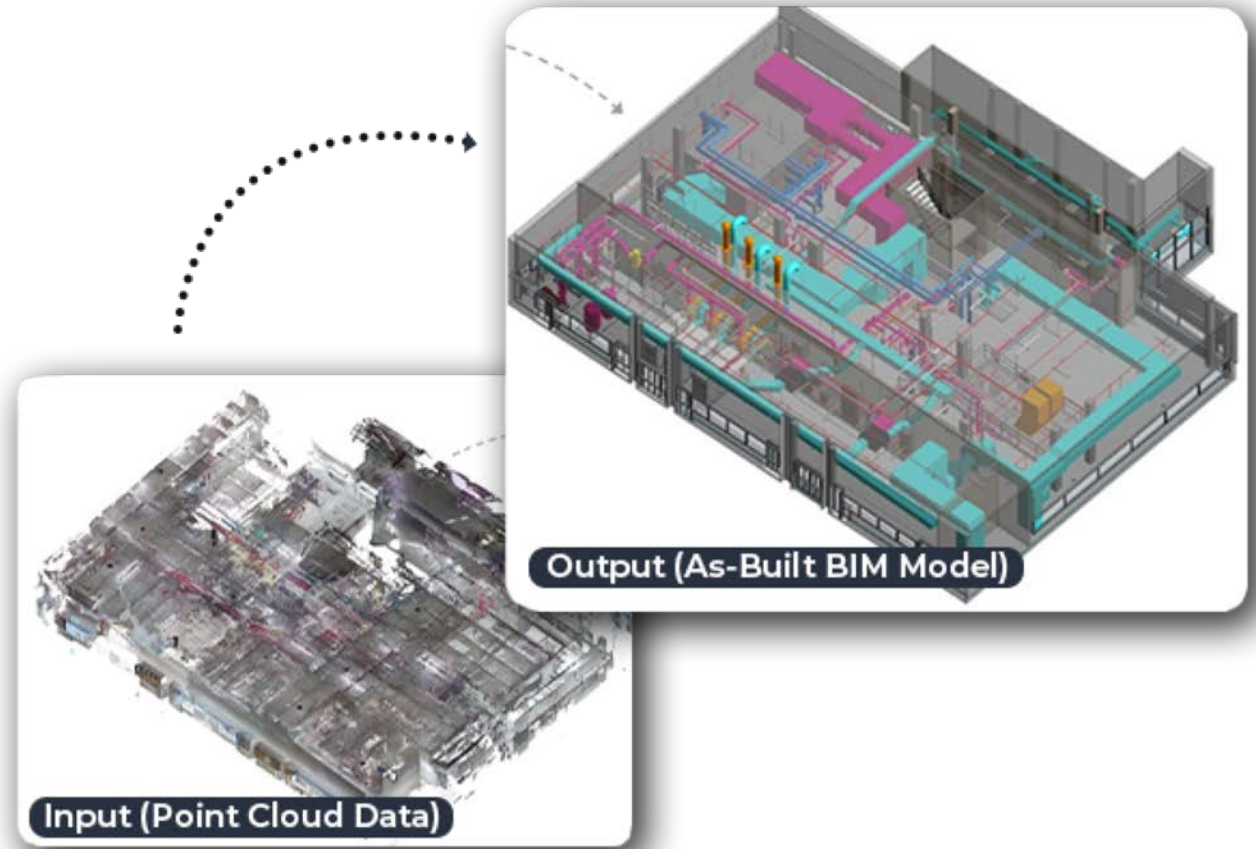
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The Convergence of Reality Capture



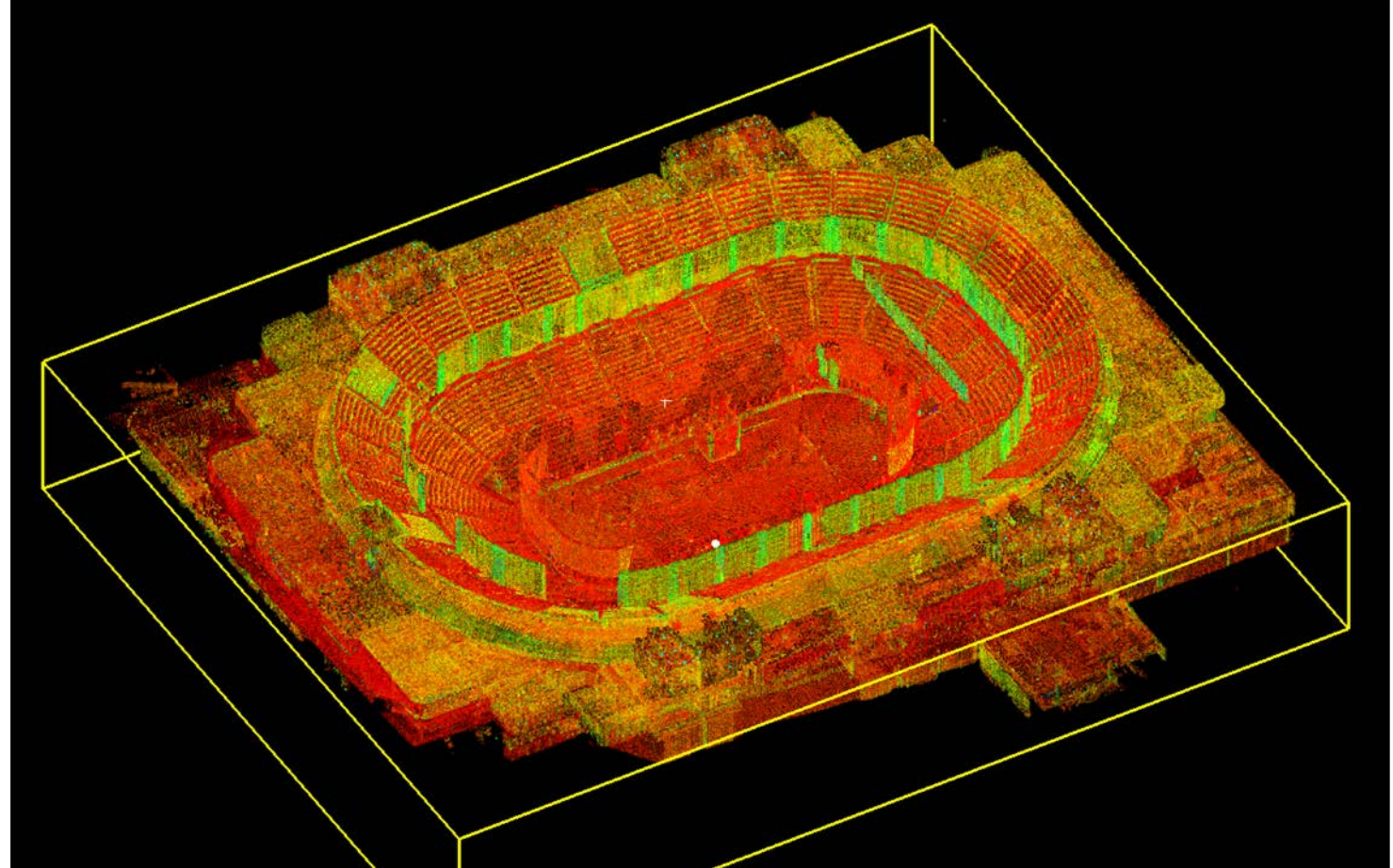
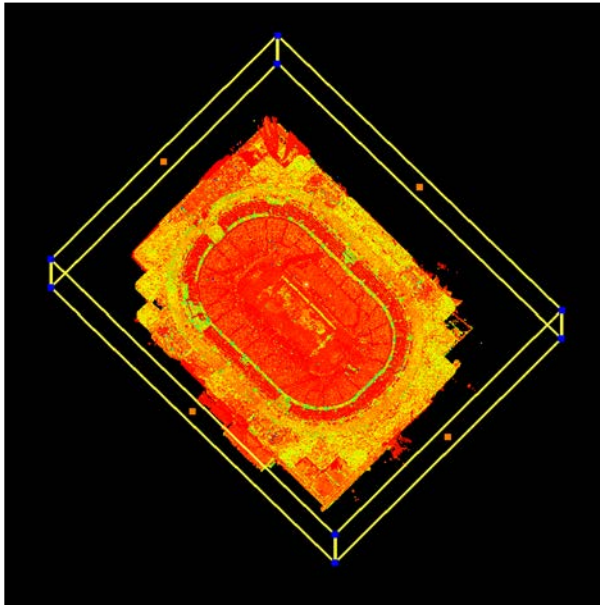
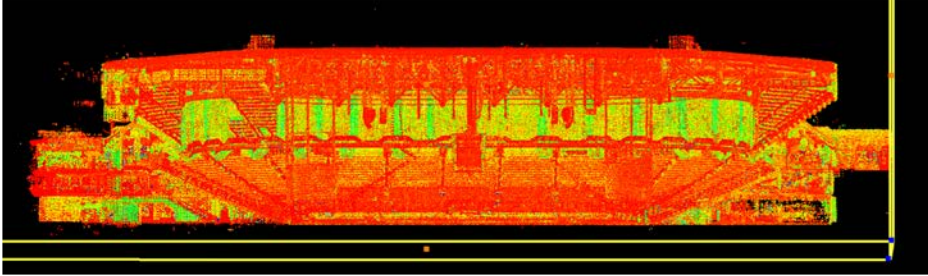


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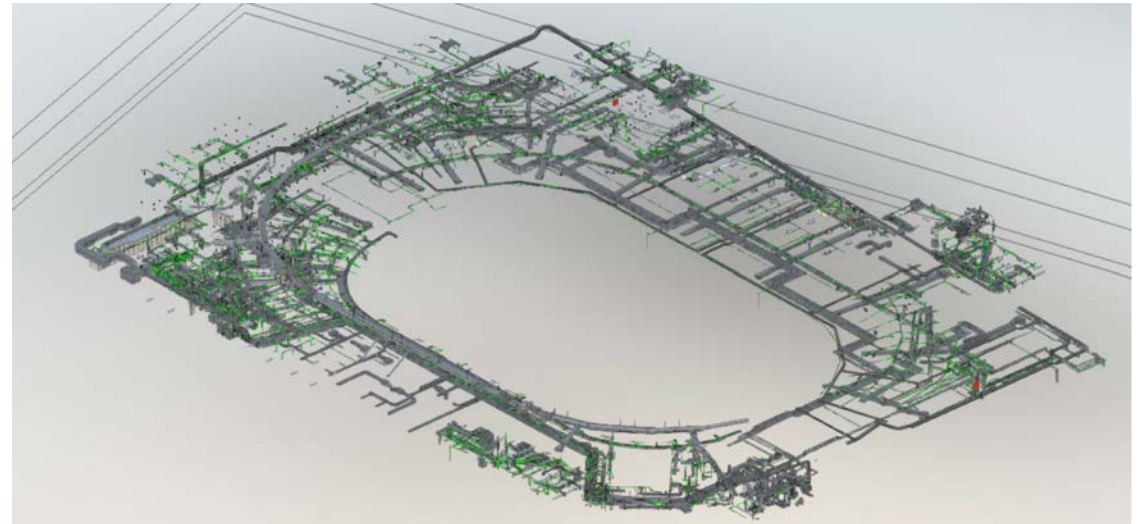
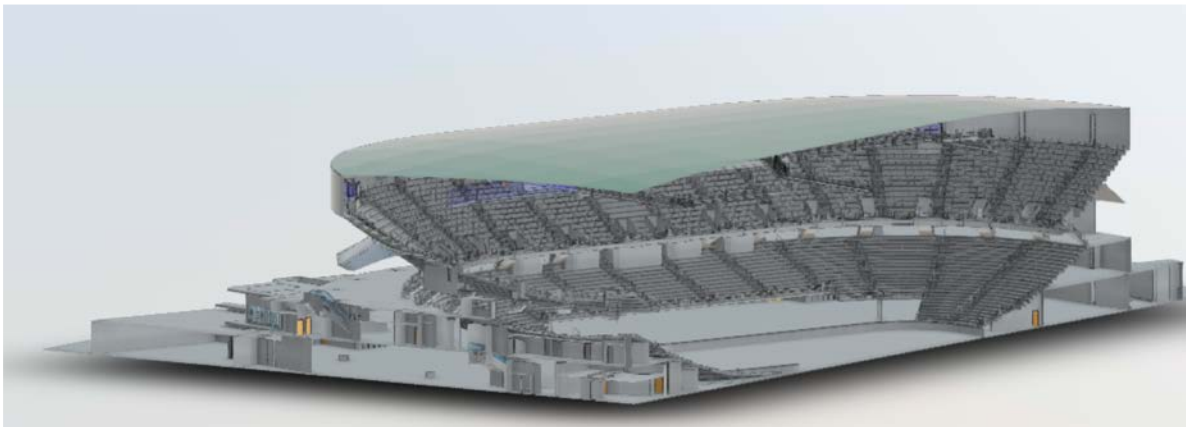
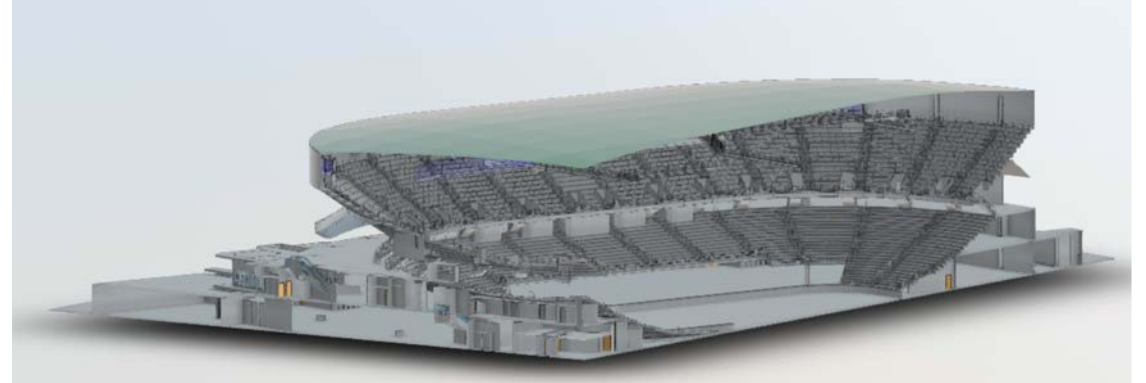
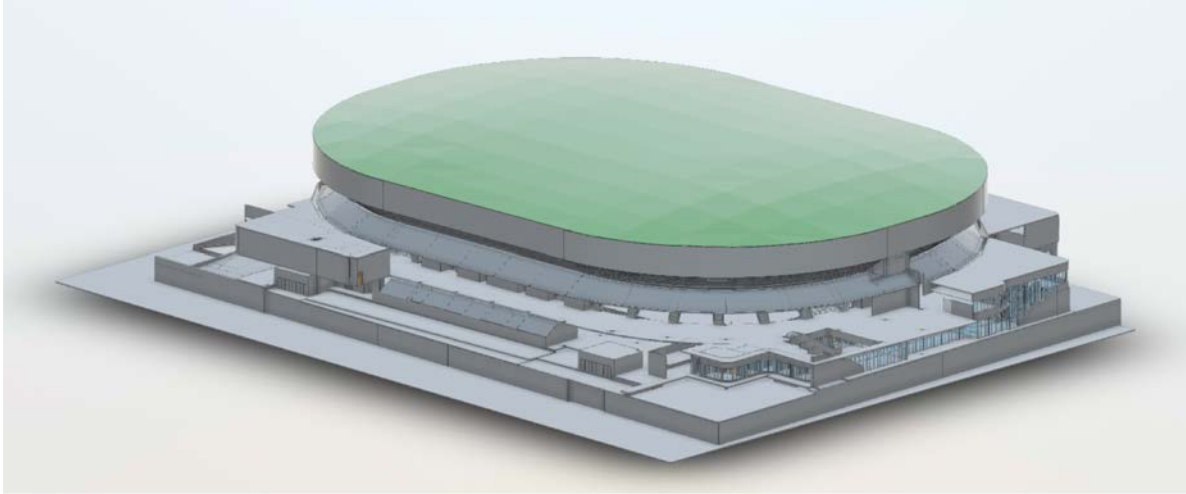


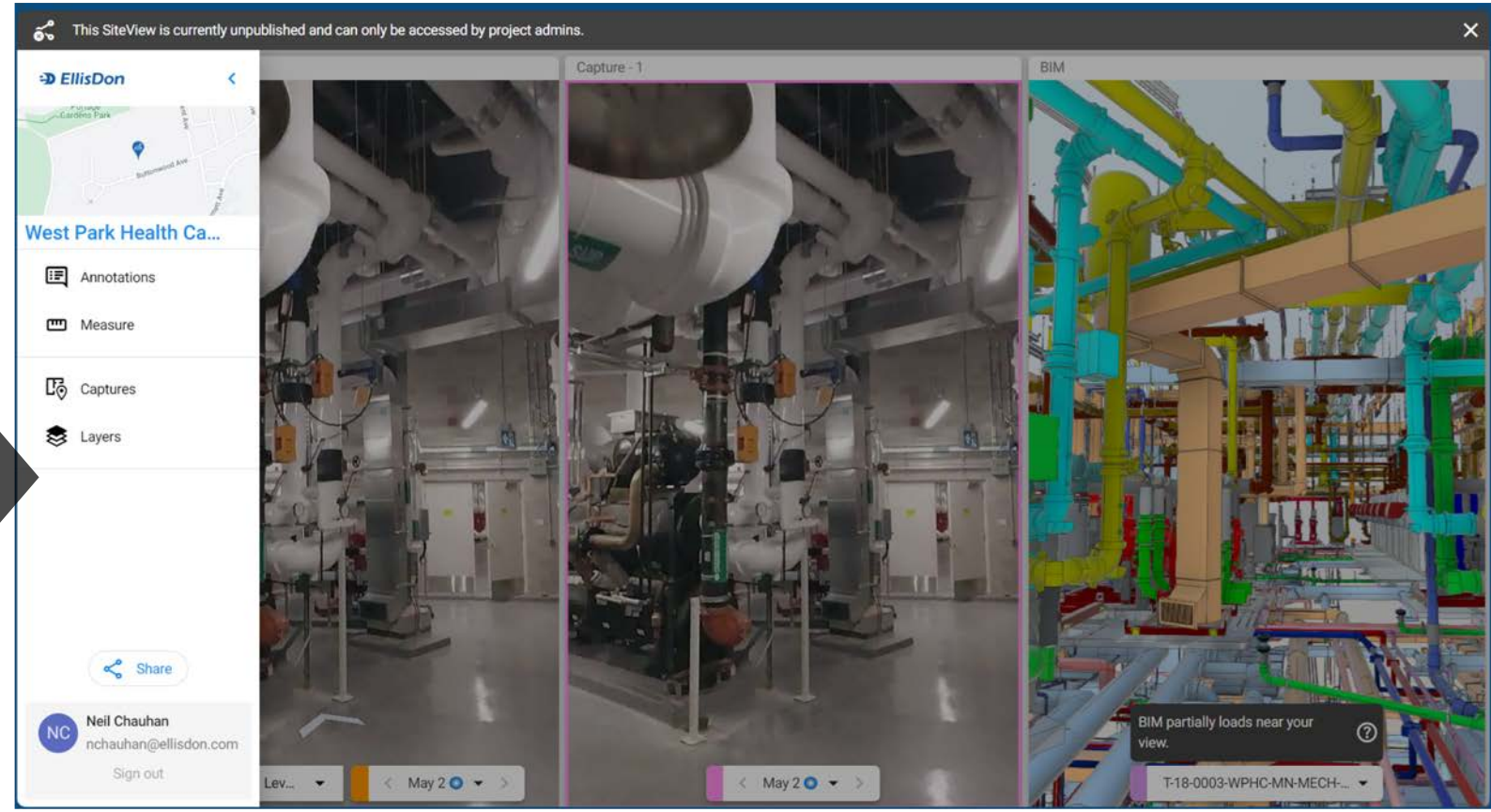
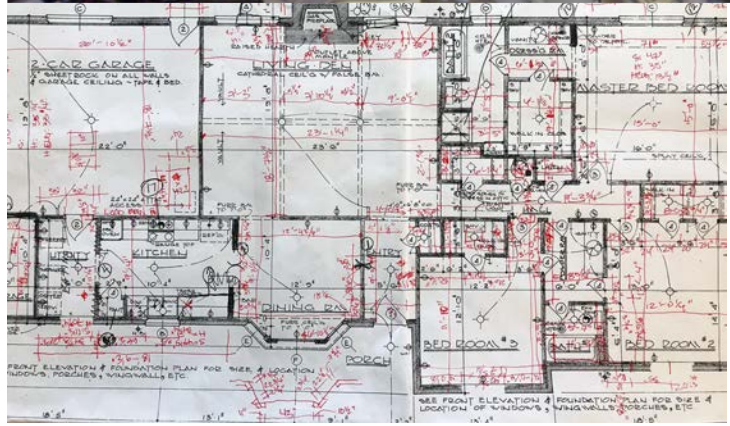
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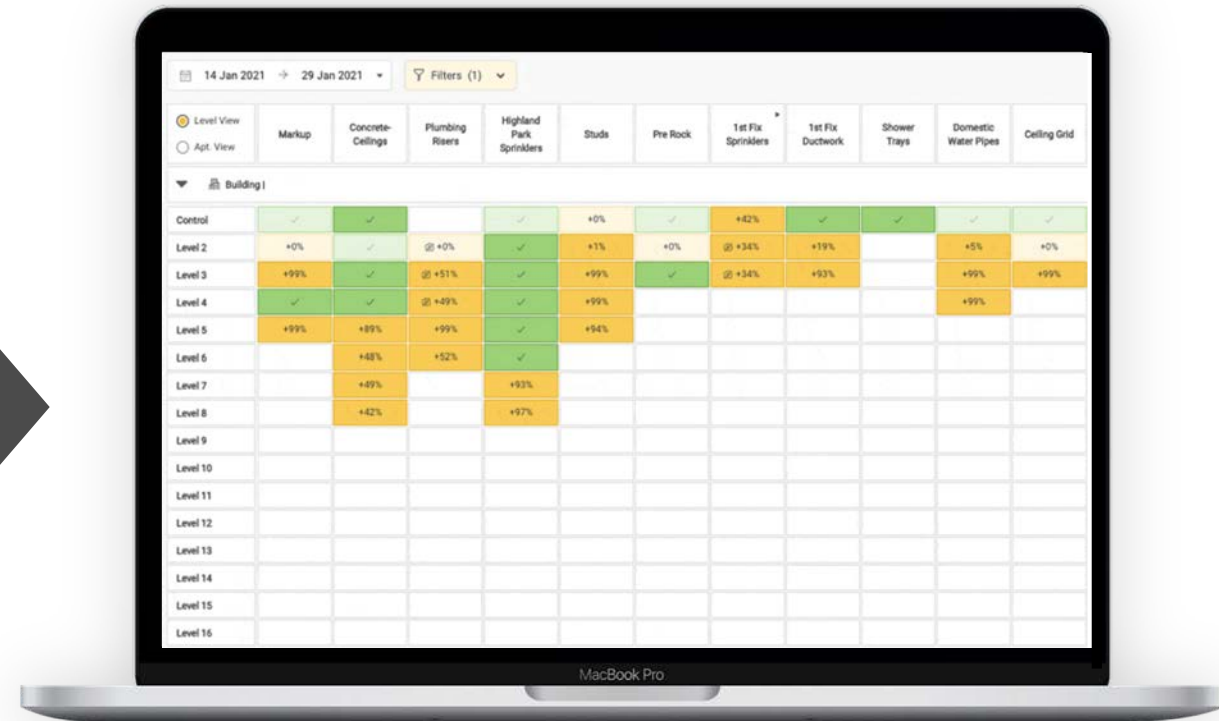
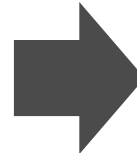
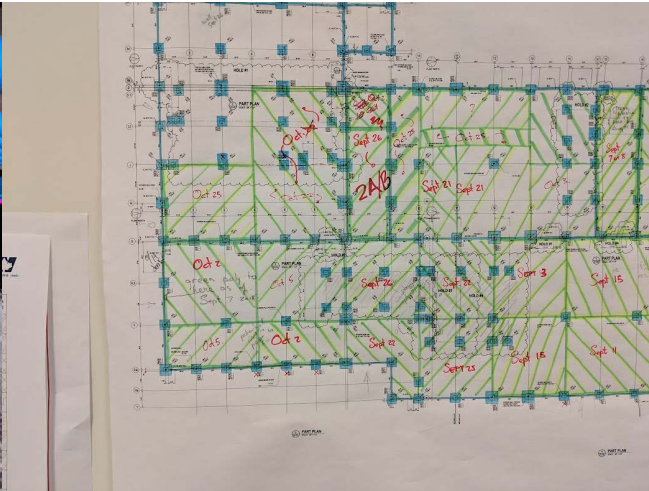
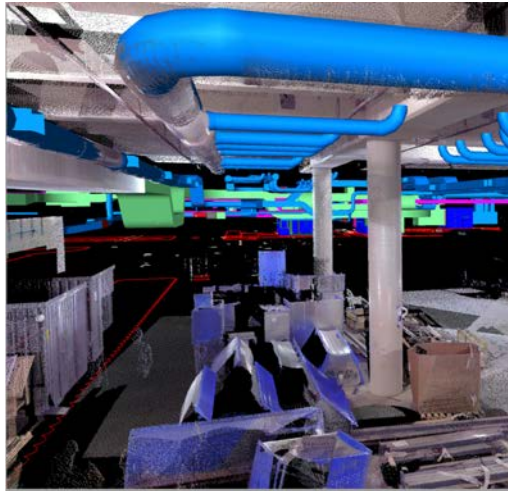
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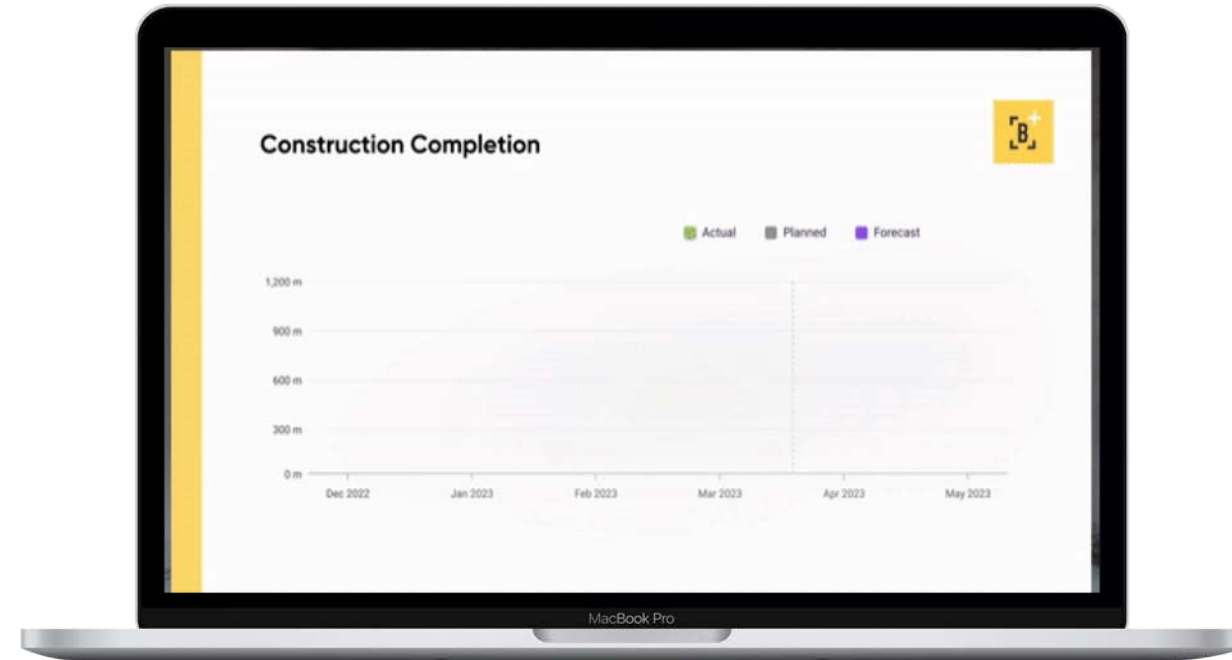
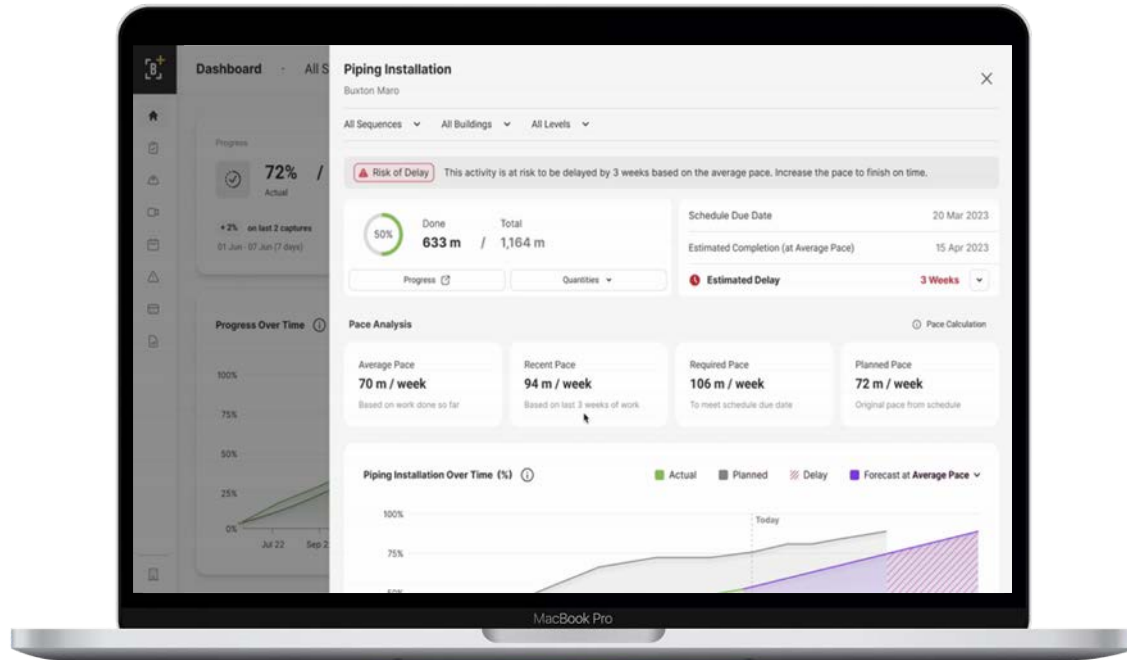


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Deliveries = Easy-to-Use + Powerful Control

11:38 AM Weekly Work Plan and Logistics

Home Deliveries Activities Insights Photos

My Status Company Data Building Hours Area Zone Equipment Today Saved Jun 06 - 12 Day Week New Delivery Admin

GMT -05:00 SUN 06 MON 07 TUE 08 WED 09 THU 10 FRI 11 SAT 12

06:00 AM

07:00 AM

08:00 AM

09:00 AM

10:00 AM

11:00 AM

12:00 PM

01:00 PM

02:00 PM

03:00 PM

04:00 PM

Total 14

1 2

2 2 0

Collect booking requests from subs on shared calendars

Control access & resources

Visualize congestion in live site maps

Notify responsible for their deliveries

Mobile forms

Direct drivers to precise site locations

DELIVERY FORM

Date & Time

Location

Loading area

Entry gate

Submit

INDP#14

May 08, 2024

9:00 - 10:30 am

Sub 1 Sub 2 Sub 3

Active

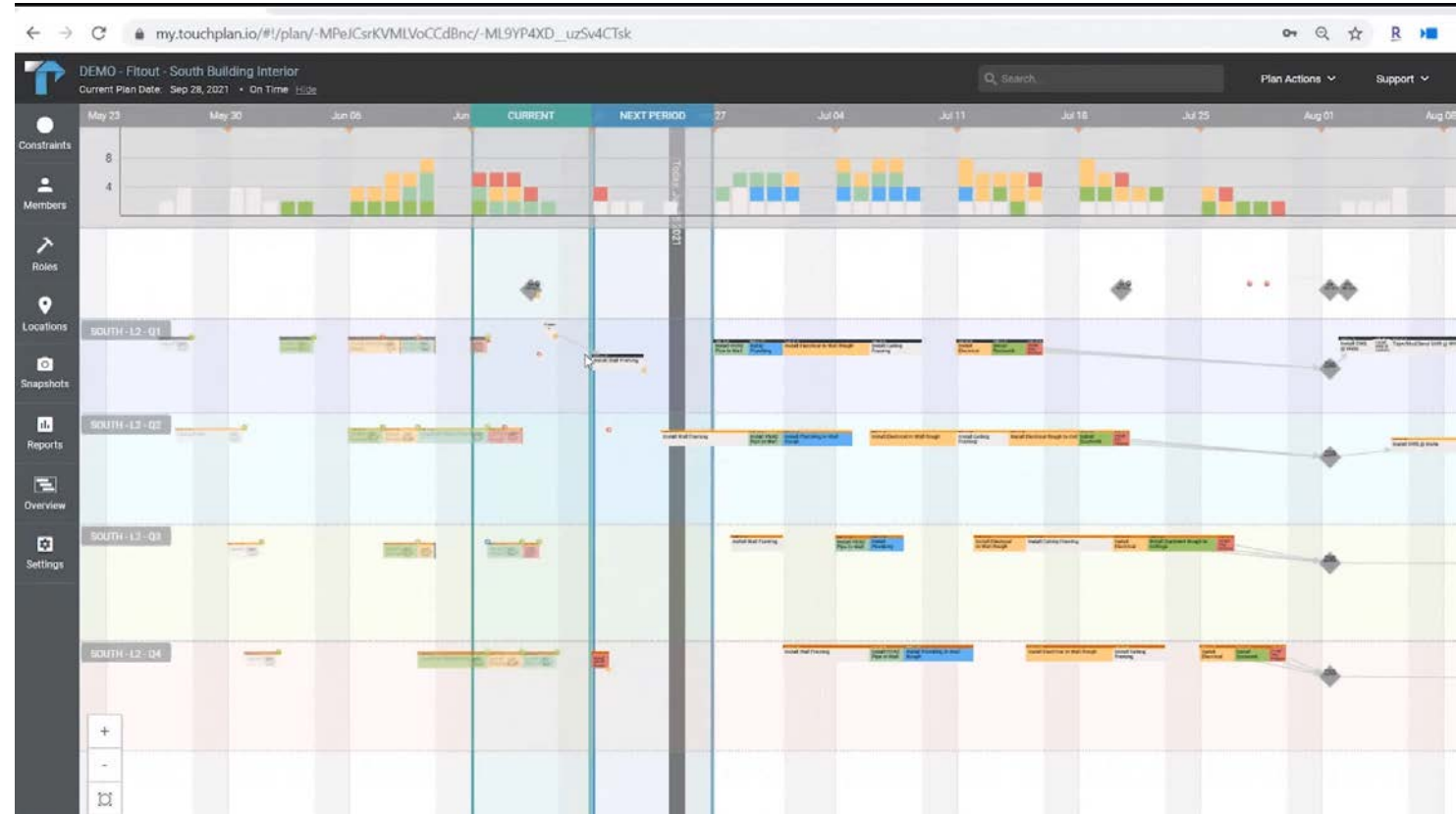
Local 8

Make it a

Go to map

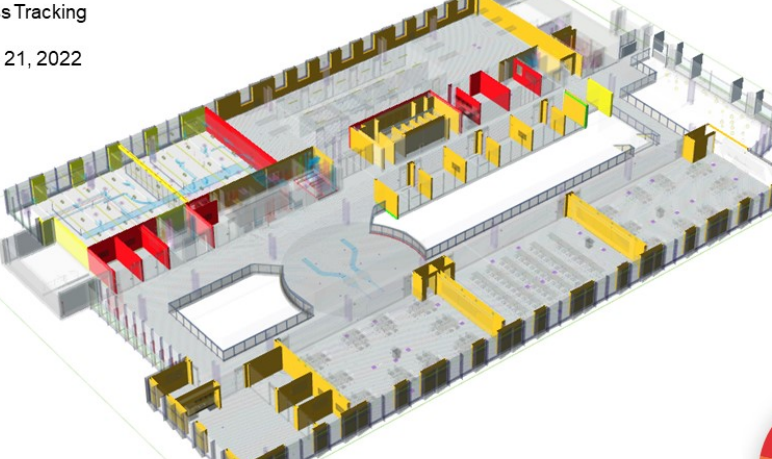


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- Boarding Progress (Vails Only)
- High Level 3D Progress Tracking
- January 21, 2022
-



A 3D architectural rendering of a large, multi-level building interior, likely a transit hub or airport terminal. The structure features a complex arrangement of yellow and red structural elements, possibly representing different levels or functional zones. The rendering shows a wide, open space with a curved, modern design. The floor is a light gray, and the walls and structural elements are primarily yellow and red. There are several large, curved walkways and platforms. The overall impression is one of a modern, spacious, and well-organized facility.

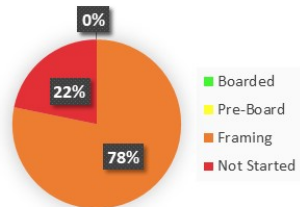
L4 -

0%

22%

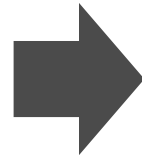
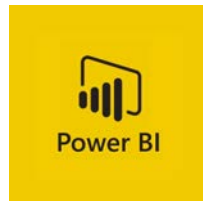
78%

L4 - Progress

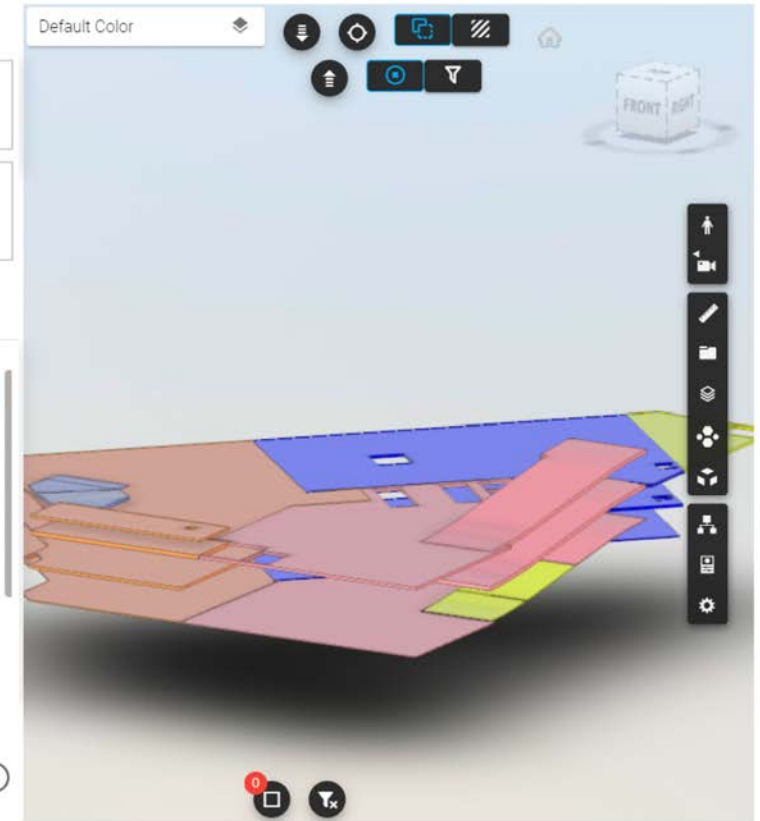
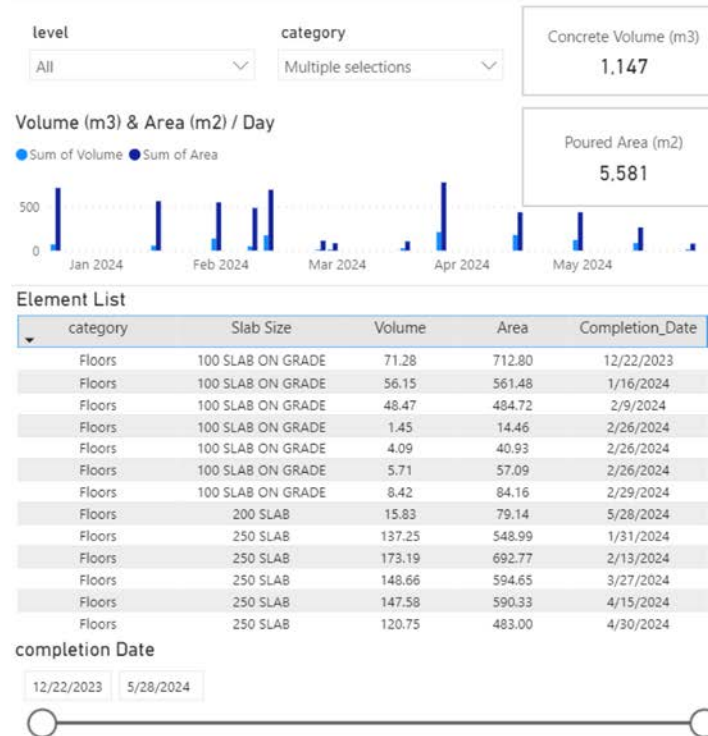




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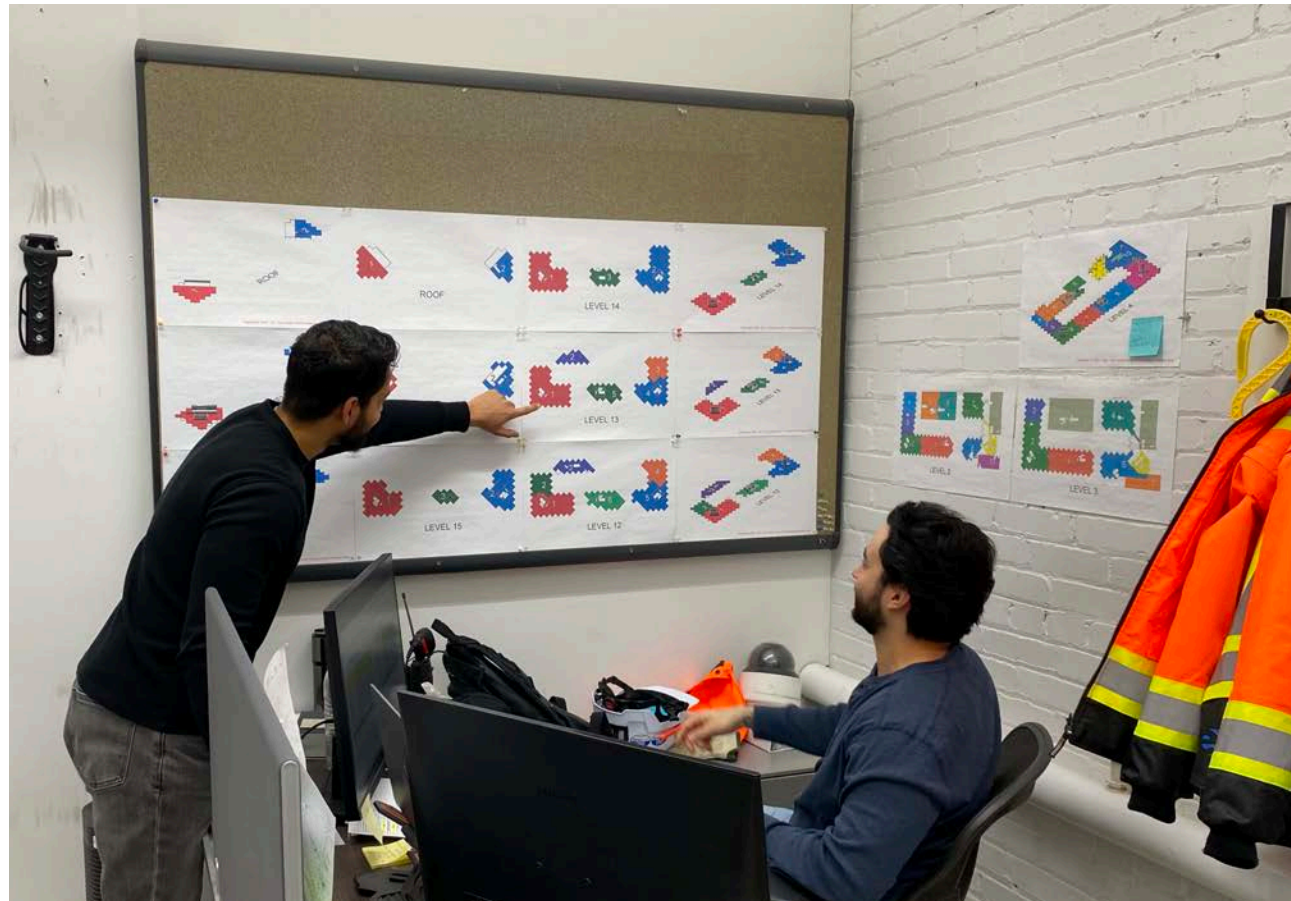
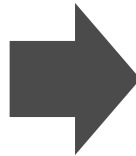


Concrete Pour Schedule - Floor



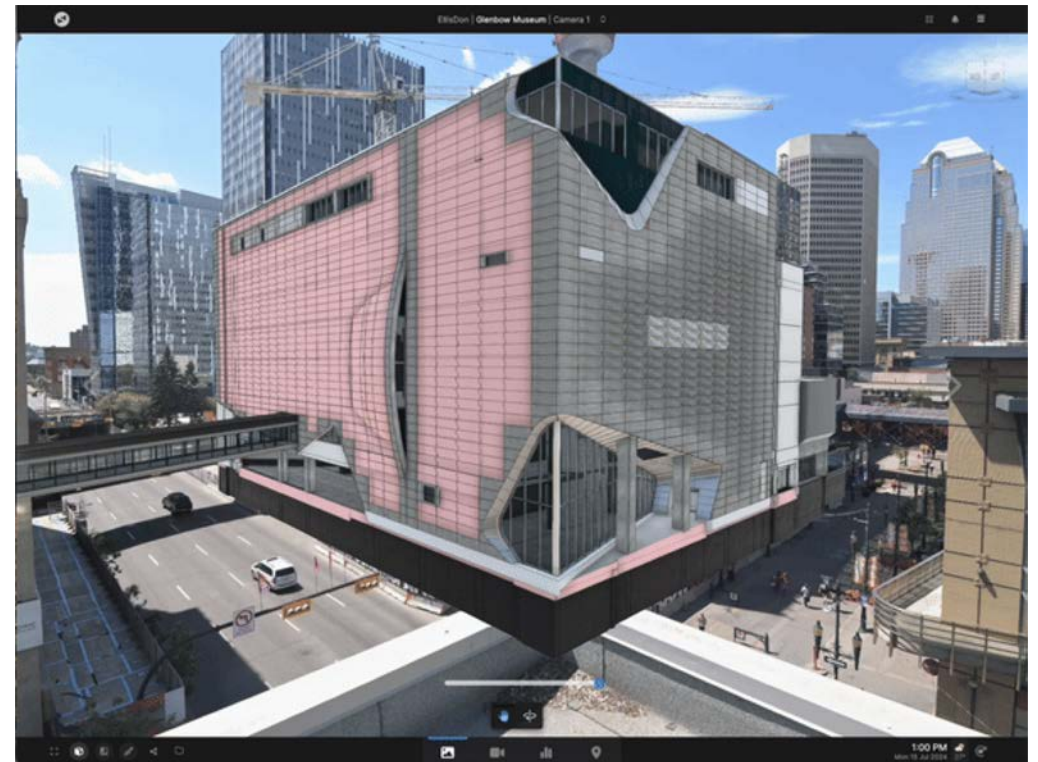


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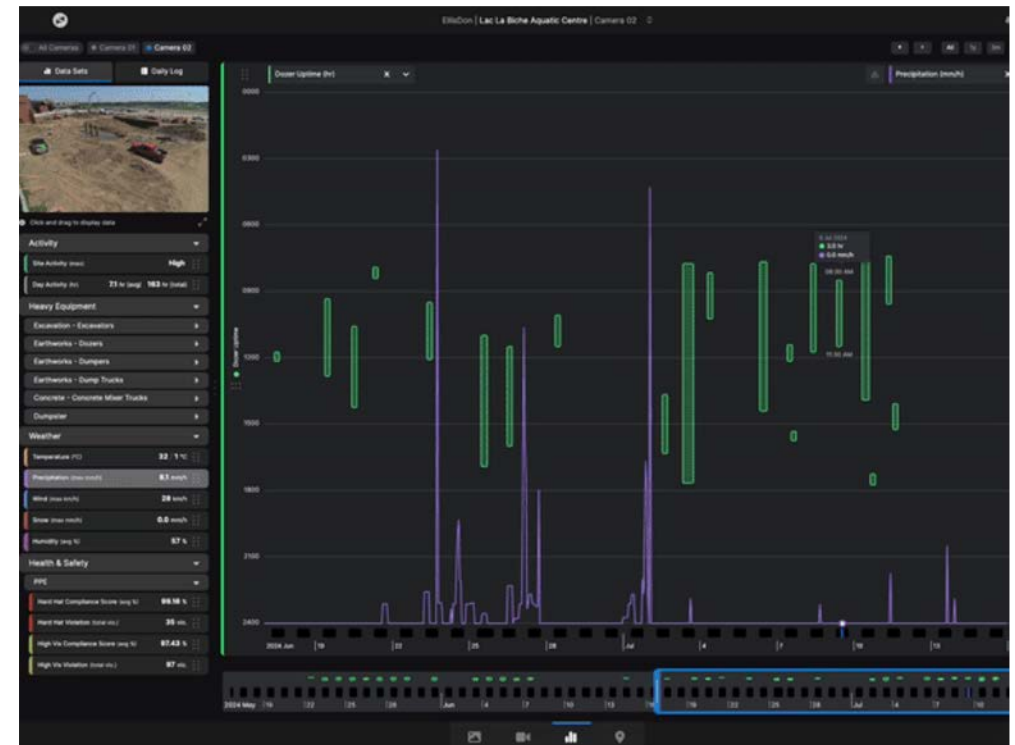
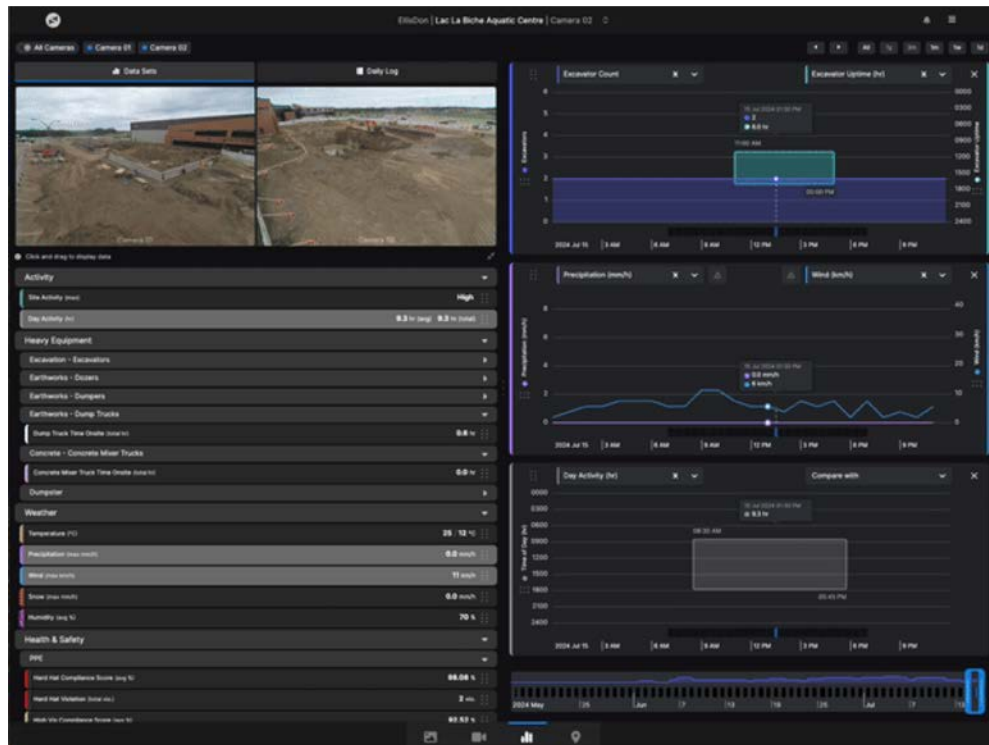


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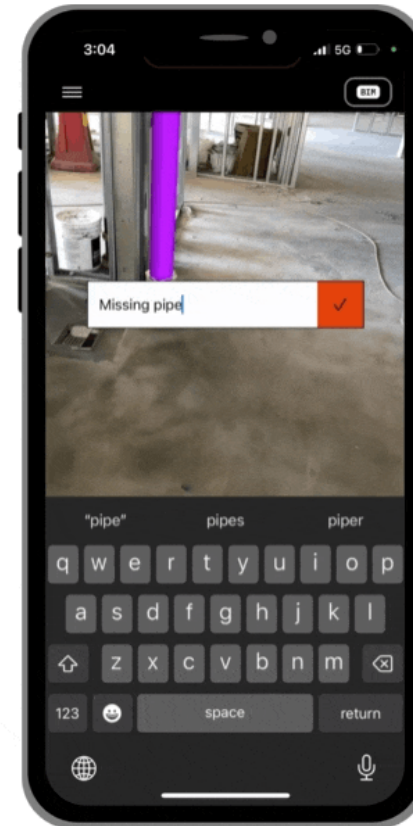


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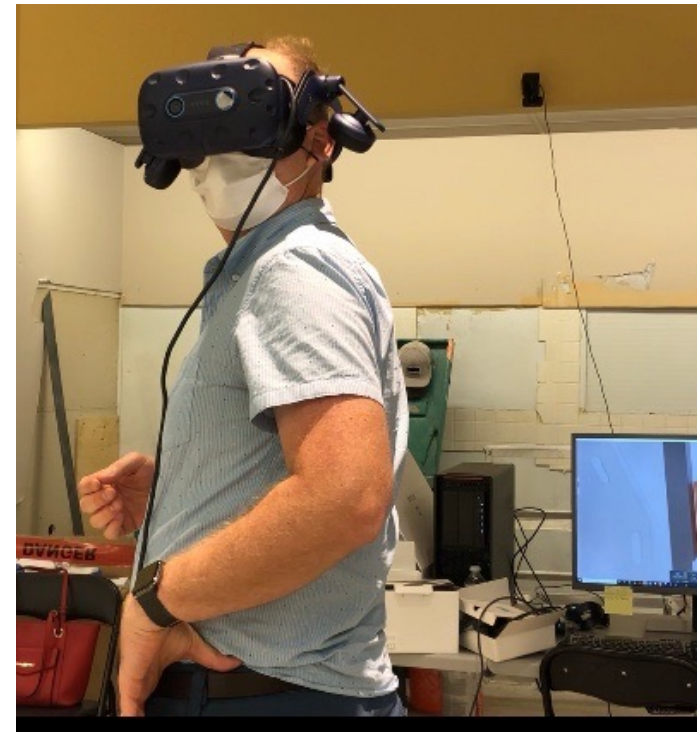


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Corridor Area



Fitness room



Social Workspace



Conference Room



Lobby Area



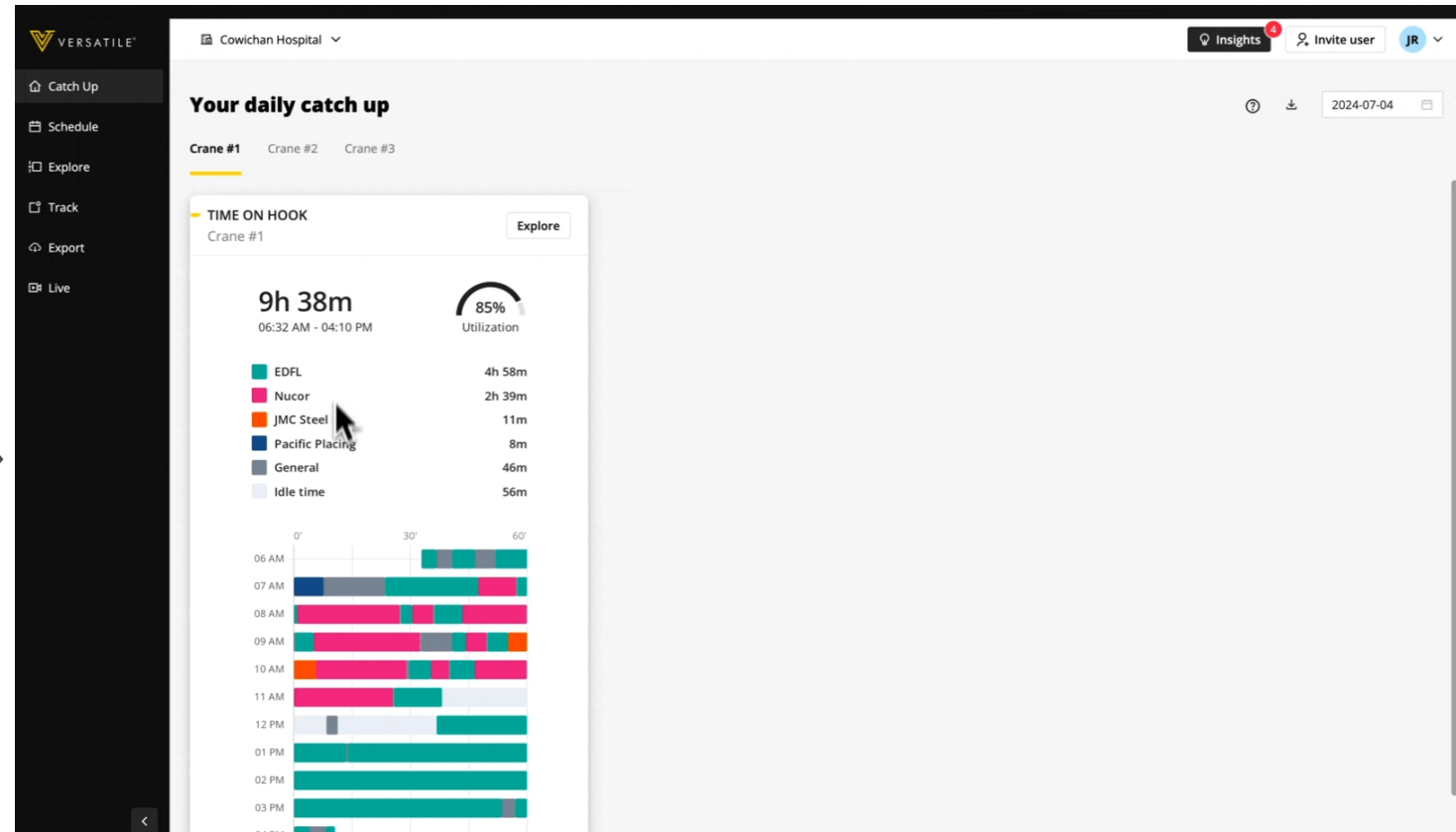


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Get Help luigi@getprovision.com



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“Self-sufficient robots to **automate** repetitive, mundane and laborious **tasks** in the muddy, dusty, otherwise unpredictable environments.”

- Optimotive





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“You can use an eraser on the
drafting table or a
sledgehammer on the
construction site.”

— Frank Lloyd Wright



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Thank You



Hammad Chaudhry
VP, Innovation & Construction Technology



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